STUDIES ON THE TAXONOMY OF THE FAMILY ENCYRTIDAE (HYMENOPTERA : CHALCIDOIDEA)

ABSTRACT

THESIS PRESENTED FOR THE DEGREE OF

DOCTOR OF PHILOSOPHY

IN

ZOOLOGY

OF

THE ALIGARH MUSLIM UNIVERSITY, ALIGARH

BY

S. M. SHAMIM

DEPARTMENT OF ZOOLOGY
ALIGARH MUSLIM UNIVERSITY
ALIGARH (INDIA)

September, 1987

ABSTRACT

The present work incorporates studies on the taxonomy of an economically important microhymenopterous parasitic family Encyrtidae (Subfamily: Tetracneminae). The work was carried out under the supervision and co-supervision of Dr. S. Adam Shafee, Reader, Department of Zoology, Aligarh Muslim University, Aligarh and Prof. P.N. Mehrotra, Head, Department of Zoology, Ranchi University, Ranchi, respectively.

The subdivision of the family Encyrtidae into subfamilies and tribes as adapted by earlier workers is discussed. Number of tarsal segments, presence or absence of paratergites and the dentition of mandibles are regarded as subfamily characters. Immovably fused or movably articulated condition of third valvulae with second valvifers, condition of the costal cell of fore wings are taken as tribal characters. Exserted or hidden condition of ovipositor, normal or flattened condition of flagellum, presence or absence of parapsidal furrows on mesoscutum, narrow or widened condition of the paratergites, presence or absence of prolongation on base of first valvifers, normal or flattened condition of the body and normal or medially constricted condition of pronotum are considered as subtribal characters.

Number and length of antennal segments, dentition of mandibles, number of segments on maxillary and labial palpi, shapes of pronotum, tenth tergum,presence or absence of antero-lateral apodemes on

subgenital plate, shape of second valvifers, presence or absence of sickle-shaped prolongation of outer plate, cylindrical or expanded condition of scape, macropterous or brachypterous condition, hyaline or infuscated condition of fore wings, punctiform or developed condition of marginal veins of fore wings are regarded as characters of generic importance. Coloration of different components of the body, size of antennal segments, length and width of the fore wings, length of marginal, postmarginal and stigmal veins are considered as specific characters.

Based on the conventional as well as genitalic characters two tribes: Aenasiini (=Neodiscodini) and Tetracnemini under the subfamily Tetracneminae and six subtribes: Tetracnemina, Anagyrina (=Anomalicornini Syn.n.), Rhopina, Charitopodina, Dinocarsiina and Ericydnina (=Grandoriellini Syn.n.) under the tribe Tetracnemini are recognized.

Taxonomic contributions made by earlier workers from various zoogeographical regions of the world are given. Illustrations are provided for better understanding of the morphological characters. Key to tribes, subtribes and genera of Indian Tetracneminae is proposed. Almost all the Indian species have been included to make the work complete. However, some of them have not been examined. The characters included in generic diagnosis, specific keys and illustrations are sufficient for the identification of the species. Therefore,

the known species have not been redescribed. The new species are described and illustrated.

One new genus, Apodoliphoceras gen.n. is proposed. Nine new species: Tetracnemus terebratus sp.n., Tetracnemus halimi sp.n., Mira ajmerensis sp.n., Anagyrus albiclavatus sp.n., Anagyrus crassipennis sp. n., Anagyrus nigriclavatus sp. n., Anagyrus post-marginalis sp.n., Metaphaenodiscus nigropedicellus sp.n., and Platyrhopus aligarhensis sp.n. are proposed.

The tribes Anomalicornini Trjapitzin and Grandoriellini Trjapitzin are synonymized with Anagyrina and Ericydnina respectively. The genera Paraclausenia Hayat and Adektitopus Noyes & Hayat are synonymized with Clausenia Ishii, Neocharitopus Hayat et al. with Charitopus Foerester, Leptanusia De Santis with Anagyrietta Ferriere and Cremesina Noyes & Hayat with Anagyrus Howard.

Seven specific synonymies are proposed. Paraclausenia herbicola Hayat and Clausenia indica Shafee & Avasthi are synonymized with Clausenia lacca (Agarwal), Adektitopus gordhi Noyes & Hayat with Clausenia longipennis Shafee & Avasthi, Anagyrus ferus Noyes & Hayat with Mashhoodia flava Shafee, Anagyrus agraensis Saraswat and Anagyrus inopus Noyes & Hayat with Anagyrus indicus Shafee et al. and Anagyrus punctulatus Agarwal with Anagyrus swezeyi Timberlake.

Nine new combinations are established: Eotopus albipedicellus (Shamim & Shafee) comb.n. from Ericydnus. Apoleptomastix ranchiensis

(Shamim & Shafee) comb.n. from Xiphomastix, Apoleptomastix longicorpus (Shamim & Shafee) comb. n. from Xiphomastix, Apodoliphoceras tachikawai (Shafee et al.) comb. n. from Doliphoceras, Anagyrietta brevicornis (Shamim & Shafee) comb. n. from Leptanusia, Anagyrietta qadrii (Hayat et al.) comb. n. from Leptanusia, Anagyrus aquilonaris (Noyes & Hayat) comb. n. from Cremesina, Anagyrus varicornis (Shamim & Shafee) comb. n. from Leptanusia and Anagyrietta indica (Subba Rao) comb. n. from Leptomastidea.

One genus, Mira Schellenberg and one species, Tetracnemus bifasciatella Mercet are reported for the first time from India.

An attempt has been made for the first time to propose the phylogeny, mainly based on conventional and genitalic characters.

Altogether 105 species (including 9 new species) representing 32 genera (including 1 new genus) have been reported from India. 8 species have already been published by the author himself.

The present work is supported by 340 illustrations arranged in 36 plates. The plates are inserted in the text at appropriate places. For the sake of convenience the legends are typed on the back of the pages.

The entire study is based on the specimens collected by the author, as well as on the specimens in the collections of Zoological Museum, Aligarh Muslim University, Aligarh. Holotypes, paratypes and

other material examined by the author have been deposited in the Zoological Museum, Aligarh Muslim University, Aligarh, India.

Altogether, three papers were published (from M.Phil. dissertation) by the author and are incorporated in the present work.+

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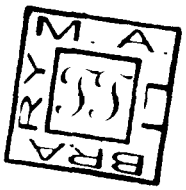

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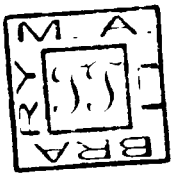

DEPARTMENT OF ZOOLOGY

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This is to certify that Mr. S.M.Shamim, lecturer, Department of Zoology, Ranchi University, Ranchi has completed his Ph.D. work under our supervision on a problem entitled "Studies on the taxonomy of the family Encyrtidae (Hymenoptera: Chalcidoidea)". This is an original contribution and also a distinct addition to the existing knowledge on the family Encyrtidae. Being satisfied with the quality and quantity of the work, he is permitted to submit it for the award of Ph.D. degree in Zoology of the Aligarh Muslim University, Aligarh.

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CONTENTS

I. ACKNOWLEDGEMENTS

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II. INTRODUCTION

The members of the family Encyrtidae constitute an economically important group of parasitic Hymenoptera attacking eggs and nymphs, mostly of homopterous pests. They keep the population of their respective host species under check in nature. Keeping in view of the economic importance of these parasites in Biological control of insect pests the present work was undertaken.

The family group name Encyrtidae was first established by Walker (1837) based on the genus Encyrtus Latrielle. Westwood (1840) treated it as subfamily Encyrtides in the family Chalcididae. Foerster (1856) named the family as Encyrtoidae. Thomson (1876) demoted it to the rank of tribe Encyrtina and assigned it under the family Pteromalidae.

Ashmead (1899) divided the family Encyrtidae into three subfamilies: Encyrtinae, Eupelminae and Signiphorinae. He (1900b) further divided the subfamily Encyrtinae into four tribes: Ectromini, Mirini, Encyrtini and Arrhenophagini based on the dentition of mandibles, number of tarsal segments and the condition of the subgenital plate.

Girault (1915a) treated Eupelminae, Tanaostigminae, Aphelininae, Signiphorinae and Encyrtinae as subfamilies of Encyrtidae. He further split the subfamily Encyrtinae into five tribes: Amirini, Eucomyini,

Ectromini, Encyrtini and Arrhenophagini. Mercet (1921) recognised only two subfamilies: Arrhenophaginae and Encyrtinae. He excluded the subfamilies: Eupelminae, Signiphorinae, Aphelininae and Tanaostigminae from the family Encyrtidae. He (1922c) added a third subfamily Antheminae to the family Encyrtidae.

Ishii (1928) upheld Ashmead (1900b) in dividing the subfamily Encyrtinae into three tribes: Ectromini, Mirini and Encyrtini. Nikol'skaya (1952) discarded Ashmead's (1900b) and Mercet's (1921,1922c) systems of classifying Encyrtidae into subfamilies and tribes. She gave an artificial key to one hundred and nine genera of the U.S.S.R. Ferriere (1953) followed Mercet (1921,1922c) and also added the fourth subfamily Signiphorinae to Encyrtidae.

Hoffer (1955) followed Mercet (1921,1922c) in dividing the family Encyrtidae into three subfamilies: Encyrtinae, Arrhenophaginae and Antheminae. He further divided the subfamily Encyrtinae into twenty tribes: Anomalicornini, Anagyrini, Quadencyrtini, Prionomasticini, Microteryini, Cheiloneurini, Aphycini, Homalotylini, Ericydnini, Discodini, Cerapterocerini, Habrolepini, Copidosomini, Ageniaspidini, Trecnitini, Cercobelini, Ectromini, Mirini, Encyrtini and Bothriothoracini. The former sixteen tribes were proposed by the author himself.

Simultaneously, Erdos & Novicky (1955) also divided the family into three subfamilies: Encyrtinae, Arrhenophaginae and Antheminae.

They subdivided the subfamily Encyrtinae into fifteen tribes: Tetracnemini, Bothriothoracini, Entromini, Mirini, Encyrtini, Quadencyrtini, Homalotylini, Aphycini, Pseudrhopini, Leptomastidini, Microteryini, Trechnitini, Copidosomini, Habrolepini and Cercobelini. The last seven tribes were proposed by the authors themselves.

Alam (1957) laid emphasis for the first time on the generic importance of pronotum and external female genitalic characters. These characters were later utilized by most of the recent workers.

Ghesquiere (1958a) proposed the tribe Psyllecthrini for his genus Psyllecthrus under the subfamily Arrhenophaginae. Compere & Annecke (1960), Tachikawa (1963) and Kerrich (1967) followed Ashmead (1900b) in dividing the subfamily Encyrtinae into three tribes: Ectromini, Mirini and Encyrtini. They further stabilized these tribes by proposing two new tribal characters: presence or absence of the paratergites and the presence or absence of the third valvulae. Kerrich (1964c) renamed the tribes Ectromini and Mirini as Anagyrini and Bothriothoracini respectively. He (1967) divided the tribe Anagyrini into five subtribes: Anagyrina, Ericydnina, Aenasiina, Dinocarsiina and Aphycina on the basis of the characters of tenth tergum, paratergites, third valvulae and sclerotization and punctation of the head etc.

Trjapitzin (1973a,1973b) divided the family Encyrtidae into two subfamilies: Tetracneminae and Encyrtinae. He divided the subfamily Tetracneminae into twelve tribes and Encyrtinae into thirty-six tribes.

Hayat et al. (1975) and Shafee et al. (1975) followed Mercet (1921,1922c) in dividing the family Encyrtidae into three subfamilies: Encyrtinae, Arrhenophaginae and Antheminae. They followed Compere & Annecke (1960), Tachikawa (1963) and Kerrich (1967) in subdividing the subfamily Encyrtinae into three tribes: Anagyrini, Encyrtini and Bothriothoracini. They gave separate keys to subfamilies, tribes and genera of Indian Encyrtidae.

Alam & Shafee (1981) divided the family Encyrtidae into three subfamilies and six tribes: Tetracneminae (Tetracnemini & Aenasiini), Encyrtinae (Encyrtini & Bothriothoracini) and Arrhenophaginae (Arrhenophagini & Anthemini). The division is mainly based on the number of tarsal segments, presence or absence of paratergites and the presence or absence of third valvulae.

Noyes & Hayat (1984) gave an artificial key to 263 encyrtid genera of Indo-Pacific region. They attributed the genera under 36 tribes representing the subfamilies Tetracneminae and Encyrtinae. Later, Hayat (1985) also gave an artificial key to 149 genera of India and adjacent countries.

Kaul & Agarwal (1985) followed Hayat et al. (1975) and Shafee et al. (1975) systems of dividing the family Encyrtidae into subfamilies and tribes. They gave separate keys to genera of Bothriothoracini and Anagyrini.

Taxonomic contributions on encyrtid parasites made by earlier workers from various zoogeographical regions of the world are as follows:

Australian region: Ashmead (1900a), Dodd (1917), Ferriere (1947), Girault (1913b, 1913c, 1913d, 1913e, 1914a, 1914b, 1915a, 1917b, 1917e, 1917g, 1918, 1920a, 1920c, 1921a, 1921b, 1922a, 1922b, 1922c, 1922d, 1922e, 1923a, 1923b, 1923c, 1923d, 1924a, 1925b, 1926a, 1926b, 1926c, 1927a, 1927b, 1929b, 1931, 1932a, 1932b, 1932c, 1934a, 1935, 1938, 1939b, 1940, 1941), Johnson & Tiegs (1921), Prinsloo (1976b), Prinsloo & Annecke (1978a), Riek (1962d), Risbec (1956), Sands & Snowball (1980), Tachikawa & Valentine (1969a,1969b), Timberlake (1929).

Ethiopian region: Annecke (1969,1971a,1974), Annecke & Mynhardt (1970a, 1970b, 1971, 1972, 1981), Annecke & Prinsloo (1974), Compere (1928, 1937a,,1938, 1939), Ferriere (1951), Ghesquiere (1946), Hoffer (1976,1980), Noyes (1982), Prinsloo (1976a, 1977, 1979, 1981, 1982), Prinsloo & Annecke (1978b, 1979), Prinsloo & Mynhardt (1982), Risbec (1954,1956), Silvestri (1915a, 1915b).

Neartic region: Ashmead (1894, 1901), Beardsley (1969, 1976), Brethes (1913, 1916), Compere (1926, 1928, 1957), Ghesquiere (1957), Girault (1911, 1915d, 1916a), Howard (1887, 1895), Peck (1963), Timberlake (1918, 1919b, 1920, 1922a, 1923, 1924), Trjapitzin & Gordh (1978a, 1978b).

Neotropical region: Ashmead (1904c), Blanchard (1936,1940), Brethes (1920,1921), De Santis (1960, 1963, 1972), Dozier (1926,1927), Girault (1913a, 1915d), Gomes (1942), Hall (1974), Kerrich (1953), Noyes (1980), Trjapitzin (1982b), Waterston (1915).

Oriental region: Agarwal (+1962a, +1962b, +1963, +1965, +1966, +1970, +1974), Agarwal et al. (+1980,+1984) Ahmad (1970), Ahmad & Ghani (+1974), Alam (+1961, +1972), Alam & Shafee (+1981), Annecke (1971b), Ashmead (1904a, 1904d, 1905a, 1905b), Avasthi & Shafee (+1980), Ayyar (+1932,+1934), Ayyar & Margabandhu (+1934a,+1934b), Beaver (1979), Bhatnagar (+1952), Cameron (1913), Compere et al. (+1960), Ferriere (1936, 1937, 1951), Gahan (+1919, 1920, 1922, 1927b), Girault (1915b, 1916c, 1917a, 1919a, 1919b, 1928b, +1932c), Gordh (1974), Hayat (+1970a, +1970b, +1972, +1973, +1977, +1979a, +1979b, +1980, +1981a, +1981b), Hayat & Khanna (+1977), Hayat & Subba Rao (+1981), Hayat & Verma (+1978, +1980), Hayat et al. (+1975), Hedqvist (1976),

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+ Contributions from Indian region

Howard & Ashmead (1896), Ishii (1940), Kaul & Agarwal (1985), Kerrich (1964a), Khan & Agarwal (1976a, 1976b, 1978), Khan & Shafee (1975), Loginovskaya (1983), Mani (1935, 1939, 1941), Mani *et al.* (1973, 1974), Mercet (1922a), Motschulsky (1863), Myartseva (1979), Narayanan (1960), Noyes (1979), Noyes & Chua (1977), Saraswat & Mukerjee (1975), Shafee (1971, 1972a, 1972b, 1981), Shamim & Shafee (1984, 1985a, 1985b), Shafee, Alam & Agarwal (1975), Subba Rao (1957, 1965a, 1965b, 1966, 1967, 1977), Subba Rao & Hayat (1979), Subba Rao & Rai (1970), Tachikawa (1978, 1979b), Timberlake (1932), Trjapitzin (1965, 1982b), Trjapitzin & Khlopunov (1976), Trjapitzin *et al.* (1977).

Palaeartic region: Alam (1957), Annecke (1967), Ashmead (1904b), Boucek (1970, 1977a, 1977b), Compere (1926), Domenichini (1951), Erdos (1957a, 1957b, 1961), Erdos & Novicky (1955), Ferriere (1953, 1955a), Girault (1915b), Graham (1969), Hoffer (1953, 1957, 1960, 1963, 1965), Huang (1980), Ishii (1925, 1928), Jansson (1967), Jiang (1982), Kerrich (1964b), Khlopunov (1979), Lin & Tao (1979), Masi (1917a), Mercet (1916b, 1916c, 1917a, 1917c, 1918, 1919, 1922b, 1923a, 1923b, 1925b), Noyes (1982), Risbec (1951), Sugonjaev (1960, 1964), Szelenyi (1971, 1972a), Tachikawa (1963, 1970), Tachikawa *et al.* (1981), Trjapitzin (1962a, 1964a, 1964b, 1968, 1969b, 1971a, 1971b, 1981, 1982a), Viggiani (1966), Westwood (1832, 1833a, 1837, 1838, 1840).

The present author upholds Alam & Shafee (1981) system of dividing the family Encyrtidae into subfamilies and tribes. The key proposed by them is represented below:

Key to subfamilies of Encyrtidae Walker

1. Tarsi 5-segmented; fore wings with all or any of the marginal, postmarginal and stigmal veins long; labial palpi 2 to 3-segmented 2
- Tarsi 4-segmented; fore wings with marginal, postmarginal and stigmal veins very short; labial palpi mono-segmented..... ..... Arrhenophaginae Ashmead
2. Paratergites present; subgenital plate usually reaching apex of abdomen; third valvulae in most genera fused with second valvifers; mandibles generally bidentate, rarely tridentate.... ..... Tetracneminae Howard
- Paratergites absent; subgenital plate usually not reaching apex of abdomen; third valvulae in most genera movably articulated with second valvifers; mandibles generally tridentate, frequently with two sharp teeth and a truncation, rarely bidentate or entirely truncated apically..... Encyrtinae Walker

In the present work only the subfamily Tetracneminae is undertaken. The subfamily is known to contain thirty two genera (including one new genus) representing one hundred and five species

(including nine new species) from India. Eight species have already been published by the author himself. The genera are assigned under the tribes Aenasiini (= Neodiscodini) and Tetracnemini representing the subtribes : Tetracnemina, Dinocarsiina, Charitopodina, Anagyrina (= Anomalicornini Syn. n.) and Rhopiina.

Illustrations (figs 1-2) are provided for better understanding of the morphological characters. Key to tribes, subtribes and genera of Indian Tetracneminae is proposed. Almost all the Indian genera and species have been included to make the work complete, however, some of them have not been examined. The characters included in generic diagnosis, specific keys and illustrations are sufficient for the identification of the species. Therefore, the known species have not been redescribed. The new species are described and illustrated.

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The present work is an original contribution and also a distinct addition to the existing knowledge on the taxonomy of Encyrtidae.

Altogether three papers were published (papers 1-3 from M.Phil. dissertation) by the author and are incorporated in the present work.+

+ Permitted as per Clause 8, Chapter XXV of the University Academic Ordinances.

III. MATERIAL AND METHODS

Collections were made by visiting important agricultural spots of India. Infested plant parts were collected, cut into small pieces and then put in rearing jars (4" x 2"). The open ends of the jars were covered with paper held with rubber bands. A complete record of rearing was maintained indicating reference number, locality, date of collection, name of host plant and name of host insect. The collections were examined daily for the emerged parasites. The emerged parasites were preserved in 80% alcohol in glass vials. The preserved specimens were then separated upto specific level under the binocular microscope with the help of fine needles. Collections were also done by sweeping the vegetation in the fields.

The permanent slides were prepared to enable detailed study of important anatomical features of the parasites. The normal process of dehydration was adopted and clearing was done in clove oil. The specimens were dissected in clove oil medium under the binocular microscope with the help of fine needles to separate various components viz. antennae, mandibles, maxillary and labial palpi, pronotum, wings, apical terga of abdomen, subgenital plate, external genitalia and legs. The dissected parts were placed on a micro-slide in a drop of canada balsam and oriented to the required position and mounted. The slides were kept in a thermostat at a temperature of approximately 40° C for about one week to make them completely dry.

The permanent slides were examined under the microscope in order to make a detailed study of each component of the body. Drawings were made with the help of camera lucida. Measurements of the whole specimen as well as different parts were taken with the help of ocular micrometer and slide micrometer.

IV. SUBFAMILY TETRACNEMINAE HOWARD

Diagnosis: Body (fig. 1) small, 1 - 4 mm in length; antennae 9 to 11-segmented, usually without ring segments; mandibles usually bidentate, rarely tridentate; maxillary palpi 2 to 4-segmented, labial palpi 1 to 3-segmented; pronotum narrow; mesoscutum usually entire, rarely with traces of parapsidal furrows; axillae transverse with converging inner angles; mesopleuron convex, never divided; fore wings with speculum usually incomplete; legs with coxae normal, fore tibial spur curved, mid tibial spur long and thick, tarsi 5-segmented; paratergites present; third valvulae (fig. 2) usually fused with second valvifers, rarely articulated; subgenital plate reaching apex of abdomen; members mostly parasitic on Pseudococcids.

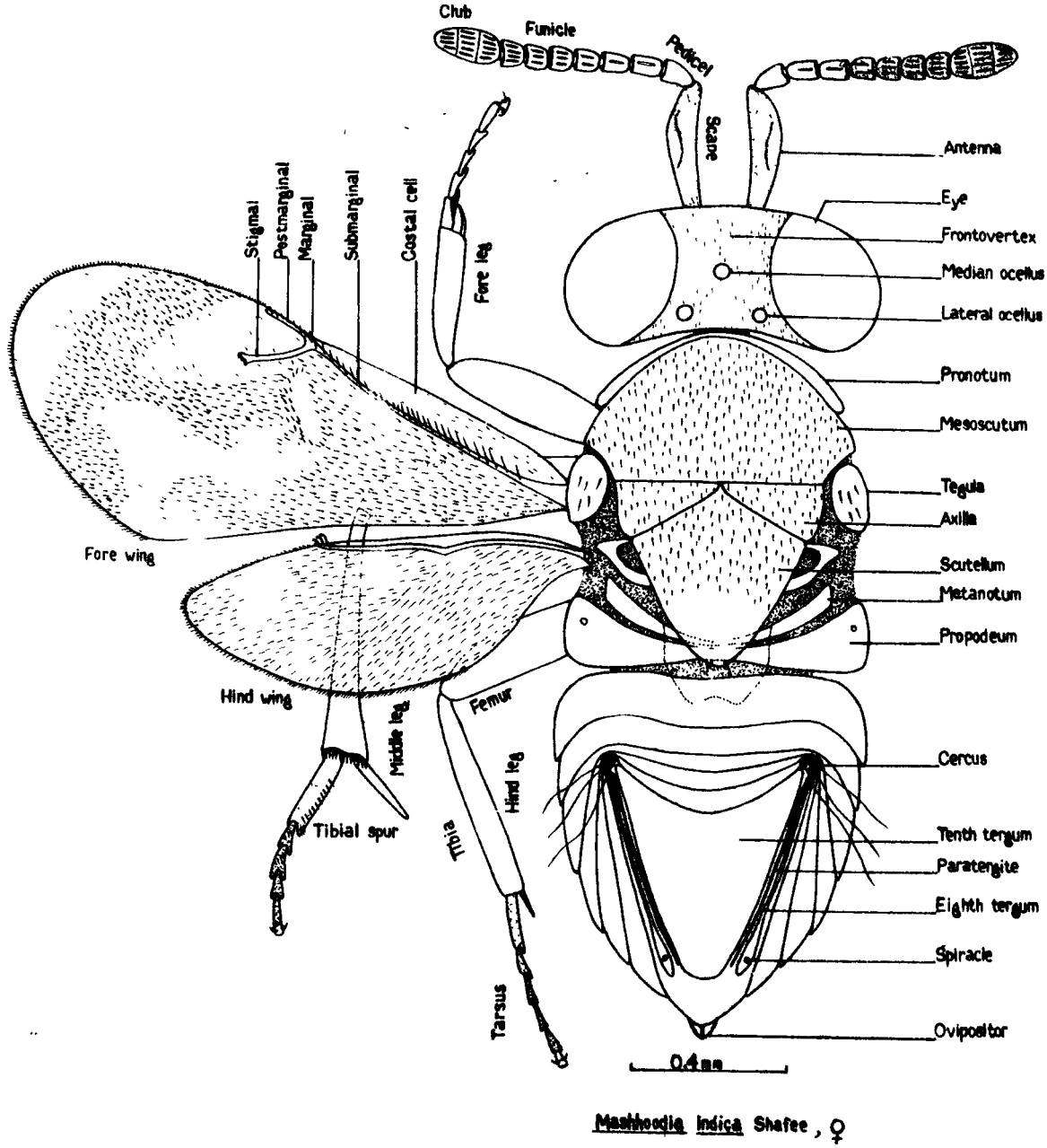

Fig. 1 Entire body

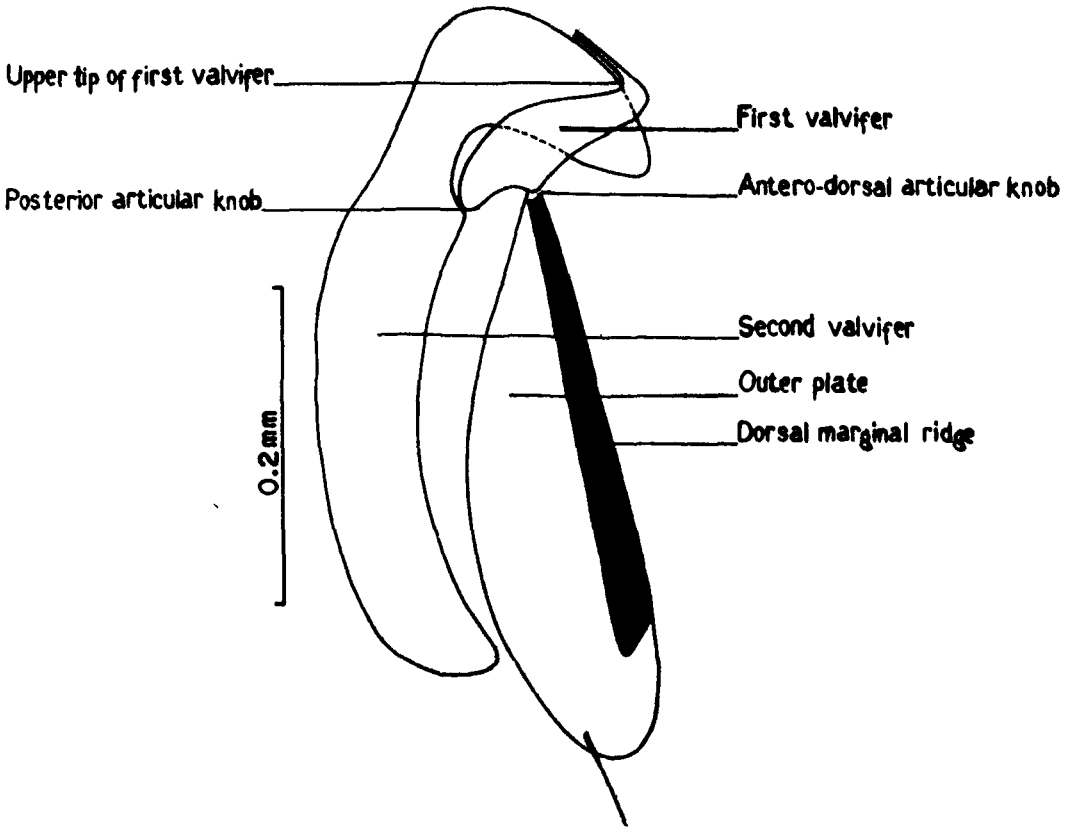

Fig. 2. Part of female external genitalia of Mashhoodia indica Shafee

Key to tribes, subtribes and genera of Indian Tetracneminae

1. Body stout, head usually coarsely punctate; costal cell of fore wings usually broad; female genitalia (figs. 3H; 4E; 5G,N) with third valvulae movably articulated with second valvifers.....AENASIINI KERRICH....6

- Body usually never stout, head usually never coarsely punctate; costal cell of fore wings usually narrow or moderately broad; female genitalia (figs. 2; 6E; 7H; 9 O) with third valvulae fused with second valvifers .....
.....TETRACNEMINI HOWARD.....2

2. TETRACNEMINI: Ovipositor hidden or slightly exserted; second valvifers broadly fused with third valvulae.....3

- Ovipositor long, much exserted; second valvifers and third valvulae (fig. 6E) connected by narrow hair-like process; outer plates very narrow with sickle-shaped prolongation apically; tenth tergum (fig. 6D) moderately broad, paratergites narrow; subgenital plate (fig. 6G) V-shaped with antero-lateral apodemes; fore wings (fig.6B) with marginal vein long, speculum complete TETRACNEMINA HOWARD
..... Tetracnemus Westwood, 1837

3. Antennae with flagellum normal scape sometimes flattened; paratergites narrow.....4

- Antennae (fig. 7B,J) completely flattened; paratergites (fig. 7F, N) widened ....DINOCARSIINA HOFFER.....9

4. Mesoscutum normal without parapsidal furrows; mandibles usually bidentate rarely tridentate; female genitalia with first valvifers lacking basal prolongation..... 5

- Mesoscutum with well developed parapsidal furrows; mandibles (figs. 9A,I;11H,I; 12 H) usually tridentate rarely bidentate; female genitalia with first valvifers (figs. 9P; 10F; 11F,N; 12 F)having prolongation basally ..... CHARITOPODINA TRJAPITZIN.....10

5. Body usually normal, head hypognathous; frontovertex normal, never broad; maxillary palpi 3 to 4segmented, labial palpi 2 to 3-segmented; pronotum (fig. 14 D) normal, sometimes broad....ANAGYRINA HOFFER, 1955....14

- Body usually flattened; head prognathous; frontovertex very broad; maxillary palpi 2-segmented, labial palpi 1-segmented (fig. 35 G); pronotum (figs. 34B; 35B) narrow with marked constriction medially..... ..... RHOPINA ERDOS & NOVICKY, 1955....27

6. AENASIINI: Head coarsely punctate; antennae usually with ring segments, funicle and club well separated, club 3-segmented; pronotum broad with convex posterior

margin; fore wings with marginal vein distinctly longer than wide; tenth tergum (figs. 4C; 5F,L) narrow to very narrow, paratergites widened basally; subgenital plate (figs. 4D; 5M) semicircular with antero-lateral apodemes; female genitalia with third valvulae short, first valvifers with basal and apical angles at different planes.....7

- Head smooth, impunctate; antennae (fig. 3C) without ring segments, funicle and club never clearly separated, club 1-segmented and obliquely truncated apically; pronotum (fig. 3D) broad with posterior margin almost straight; fore wings (fig. 3E) with marginal vein punctiform; tenth tergum (fig. 3F) moderately broad, paratergites of uniform width; subgenital plate (fig. 3G) of uniform width with distinctly lobular antero-lateral angles, posterior margin truncated in middle; female genitalia (fig. 3H) with third valvulae long, first valvifers (fig. 3I) with basal and apical angles in one plane..... Neoplatycerus Subba Rao, 1965

7. Antennae (fig. 5B, 1) with scape strongly dilated..... 8

- Antennae (fig. 4A) with scape cylindrical..... ..... Blepyrus Howard, 1898

8. Frontovertex of moderate width, one-third to one-sixth total head width; reticulate punctations descending at

least some of the way between eyes and facial impression; paratergites (fig. 5 F) broad at base, tapers posteriorly with slight curvature in apical half; first valvifers with basal margin deeply concave ..... Aenasius Walker, 1846

- Frontovertex nearly always less than one-sixth total head width; none but fine punctures descend between eyes and facial impression; paratergites uniformly narrow and hair-like; first valvifers (fig. 50) with basal margin slightly concave ..... Neodiscodes Compere, 1931

9. DINDCARSIINA: Antennae (fig. 7 J) with flagellum spindle-shaped, club 3-segmented; fore wings (fig. 7 L) with costal cell narrow, marginal vein long .... Mira Schellenberg, 1803

- Antennae (fig. 7 B) with flagellum normal, never spindle-shaped, club 1-segmented; fore wings (fig. 7 D) with costal cell broad, marginal vein short; paratergites (fig. 7 F) widened in apical half with tapering apex; subgenital plate (fig. 7 G) with anterior margin conically produced medially; female genitalia (fig. 7 H) with second valvifers of uniform width ..... Praleurocerus Agarwal, 1966

10. CHARITOPODINA: Propodeum long, at least one-third as long as scutellum; middle legs with basitarsus thick 11

- Propodeum narrow, not more than one-fifth as long as scutellum.....13

11. Fore wings well developed; antennae with funicle segments as long as or longer than wide.....12

- Fore wings (fig. 8C) much short; antennae (fig. 8A) with funicle segments distinctly wider than long..... ..... Sakencyrtus Hayat, 1981

12. Fore wings hyaline..... Eotopus Noyes & Hayat, 1984

- Fore wings with transverse dark bands..... ..... Manicnemus Hayat, 1981

13. Fore wings with submarginal vein thickened at apical one-third; tenth tergum longer than wide, paratergites widened basally; female genitalia with second valvifers having finger-like prolongation (figs. 10E; 11E,M); outer plate with sickle-shaped prolongation apically .....Clausenia Ishii, 1923

- Fore wings with submarginal vein normal, never thickened at apical one-third; tenth tergum (fig. 12D,L) small, paratergites very narrow and hair-like; female genitalia (fig. 12 E,M) with second valvifers curved without apical prolongation, outer plate without sickle-shaped prolongation apically..... ..... Charitopus Foerster, 1856

14. ANAGYRINA: Fore wings finely setose, costal cell narrow to moderately broad, marginal vein usually short; antennae with funicle segments longer than wide.....15

- Fore wings (fig. 13B) coarsely setose, costal cell broad, marginal vein long; antennae (fig. 13A) with funicle segments wider than long.....
.....Metaphaenodiscus Mercet, 1921

15. Antennae with funicle 7-segmented.....16

- Antennae with funicle 6-segmented.....17

16. Fore wing relatively slender, about 3 times as long as broad; stigmal vein very short, postmarginal vein rudimentary.....Anomalicornia Mercet, 1921

- Fore wing relatively broad, a little more than two times as long as broad; stigmal vein moderately long and slender postmarginal vein well developed (fig. 14E)
.....Alamella Agarwal, 1966

17. Club 3-segmented; maxillary palpi usually 4-segmented, labial palpi usually 3-segmented.....18

- Club 1-segmented; maxillary palpi 3-segmented, labial palpi 2-segmented Anomalencyrtus Hayat & Verma, 1980

18. Antennae long and slender, pedicel shorter than first funicle segment.....19

- Antennae short, pedicel usually as long as or longer than first funicle segment.....21

19. Fore wings with costal cell.....20

- Fore wings (fig. 15C) without costal cell; pronotum (fig. 15B) with anterior margin deeply concave, posterior margin emarginate medially; female genitalia (fig. 15E) with second valvifers of uniform width, third valvulae imperceptible, outer plate with thickened dorsal marginal inflection..... Callipteroma Motschulsky, 1863

20. Tenth tergum (fig. 16D) never accuminate apically; subgenital plate (fig. 16F) semicircular without anterolateral apodemes; female genitalia (fig. 16E) with second valvifers of uniform width, third valvulae imperceptible ..... Leptomastix Foerster, 1856

- Tenth tergum (fig. 18C) acuminate apically; subgenital plate (fig. 18F) V-shaped with well developed anterolateral apodemes; female genitalia (fig. 18D) with second valvifers narrow having finger-like prolongation apically ..... Apoleptomastix Kerrich, 1982

21. Wings well developed; eyes large.....22

- Wings rudimentary; pronotum (fig. 19C) almost of uniform width with anterior margin slightly concave in middle,

posterior margin straight; antennae (fig. 19B) with pedicel longer than following two funicle segments combined; second valvifers (fig. 19G) narrow in middle, basal three-fourth of outer plate of genitalia with thickened dorsal margin, apical one-fourth sickle-shaped.....
.....Neodusmetia Kerrich, 1964

22. Antennae with scape dilated, dilated portion dark.....23

- Antennae with scape usually cylindrical, rarely slightly dilated and usually uniformly yellow..... 25

23. Head punctate; subgenital plate without antero-lateral apodemes; female genitalia with second valvifers of uniform width, outer plate without sickle-shaped prolongation apically.....24

- Head smooth, impuctate; subgenital plate (fig. 22E; 23E; 24 E) with well developed anterio-lateral apodemes; female genitalia (figs. 22F, 26 A-H; 27 A-F) narrow medially, outer plate with sickle-shaped prolongation apically.....
.....Anagyrus Howard, 1895

24. Maxillary palpi 4-segmented, labial palpi 3-segmented; disc of fore wings (fig. 28 C,I) with coarse and transparent setae, postmarginal vein as long as or shorter than stigmal vein ..... Anagyrietta Ferriere, 1955

- Maxillary palpi 3-segmented, labial palpi 2-segmented; disc of fore wings with uniformly thickened setae, postmarginal vein longer than stigmal vein (fig. 29 B,H) .... Gyranusoidea Compere, 1947

25. Head smooth, impunctate; fore wings with stigmal vein long, never dilated 26

- Head finely punctate; fore wings (fig. 30C) with stigmal vein much dilated apically..... Leptomastidea Mercet, 1916

26. Subgenital plate semicircular without antero-lateral apodemes; female genitalia with second valvifers broad with imperceptible third valvulae, outer plate without sickle-shaped prolongation.....27

- Subgenital plate (fig. 31G) V-shaped with well developed antero-lateral apodemes; female genitalia (fig. 31E) with second valvifer narrow with third valvulae as long finger-like prolongation, outer plate with sickle-shaped prolongation..... Doliphoceras Mercet, 1921

27. Maxillary palpi 3-segmented, labial palpi 2-segmented fore wing with stigmal vein short.....28

- Maxillary palpi 4-segmented, labial palpi 3-segmented; fore wing with stigmal vein long..... Mashhoodia Shafee, 1972

28. Fore wings (fig. 33L) with distinct fuscous pattern, costal cell narrow..... Bacalusa Noyes & Hayat, 1984

- Fore wings hyaline, costal cell broad..... ..... Apodoliphoceras gen. n.

29. RHOPINA: Fore wings with costal cell narrow; subgenital plate without antero-lateral apodemes; second valvifers without finger-like prolongation; outer plate without sickle-shaped prolongation apically.....30

- Fore wings with costal cell broad; subgenital plate (fig. 34E) with antero-lateral apodemes; female genitalia (fig. 34F) with second valvifers having finger-like prolongation apically, outer plate with sickle-shaped prolongation apically..... ..... Platyrhopus Erdos, 1955

30. Club 2-segmented 31

- Club 3-segmented ..... Rhopus Foerster, 1856

31. Fore wings densely ciliate and with a well defined speculum; marginal fringe of fore wings short, less than one-fourth of wing width; second valvifers (fig. 35 E,J) narrow in middle with imperceptible third valvulae, outer plate of uniform width with thickened dorsal margin..... ..... Xanthoencyrtus Ashmead, 1902

- Fore wings (fig. 35L) sparsely, indistinctly ciliate and without speculum, marginal fringe of fore wings long, one-half of wing width ..... Hamusencyrtus Subba Rao & Hayat, 1979

A. TRIBE AENASIINI KERRICH

Aenasiina Kerrich, 1967:145.

Aenasiini; Alam & Shafee, 1981:783.

Diagnosis: Body large, usually sclerotized, never flattened; head hypognathous; mandibles usually bidentate, rarely tridentate; maxillary palpi 4-segmented, labial palpi 3-segmented; antennae usually completely flattened; pronotum normal; mesoscutum without parapsidal furrows; forewings with costal cell broad; tenth tergum never enlarged, paratergites short, narrow to broad; female genitalia (figs. 3H; 4E; 5G,N;) with third valvulae movably articulated with second valvifers.

The tribe is known to contain four genera from India and their separation is given in the key to genera.

1. Genus Neoplatycerus Subba Rao, 1965

Neoplatycerus Subba Rao, 1965b:150.

Type-species: Neoplatycerus tachikawai Subba Rao, by monotypy and original designation.

Diagnosis: Head impunctate; antennae (fig. 3 C) with scape much dilated with a narrow fold, ring segments absent, funicle and

club not clearly separated, club 1-segmented; pronotum (fig. 3D) broad with posterior margin almost straight; fore wings hyaline, marginal vein punctiform, postmarginal and stigmal veins almost subequal in length (fig. 3E); subgenital plate (fig. 3G) of uniform width without anterolateral apodemes and with distinctly lobular antero-lateral angles, posterior margin truncated in middle; tenth tergum (fig. 3F) moderately broad, paratergites of uniform width; female genitalia (fig. 3H) with first valvifer having basal and apical angles in one plane, third valvulae long.

The genus is known to contain single species from India.

i. Neoplatycerus tachikawai Subba Rao

(Fig. 3 A - I)

Neoplatycerus tachikawai Subba Rao, 1965b:150.

Material examined: 2 ♀. INDIA: Bhubaneshwar, 2 vi. 1967, ex Rastrococcus iceryoides (Green)on Mangifera indica, S.A. Shafee

Hosts: Icerya seychellarum (Westwood)

Rastrococcus iceryoides (Green)

Distribution: INDIA: Bhubaneshwar, Shahjahanpur.

Fig.3 A-I. Neoplatycerus tachikawai Subba Rao, ♀

A. Mandible

B. Maxillary & labial palpi

C. Antenna

D. Pronotum

E. Part of fore wing venation

F. Apical terga of abdomen

G. Subgenital plate

H. Part of external genitalia

I. First valvifer

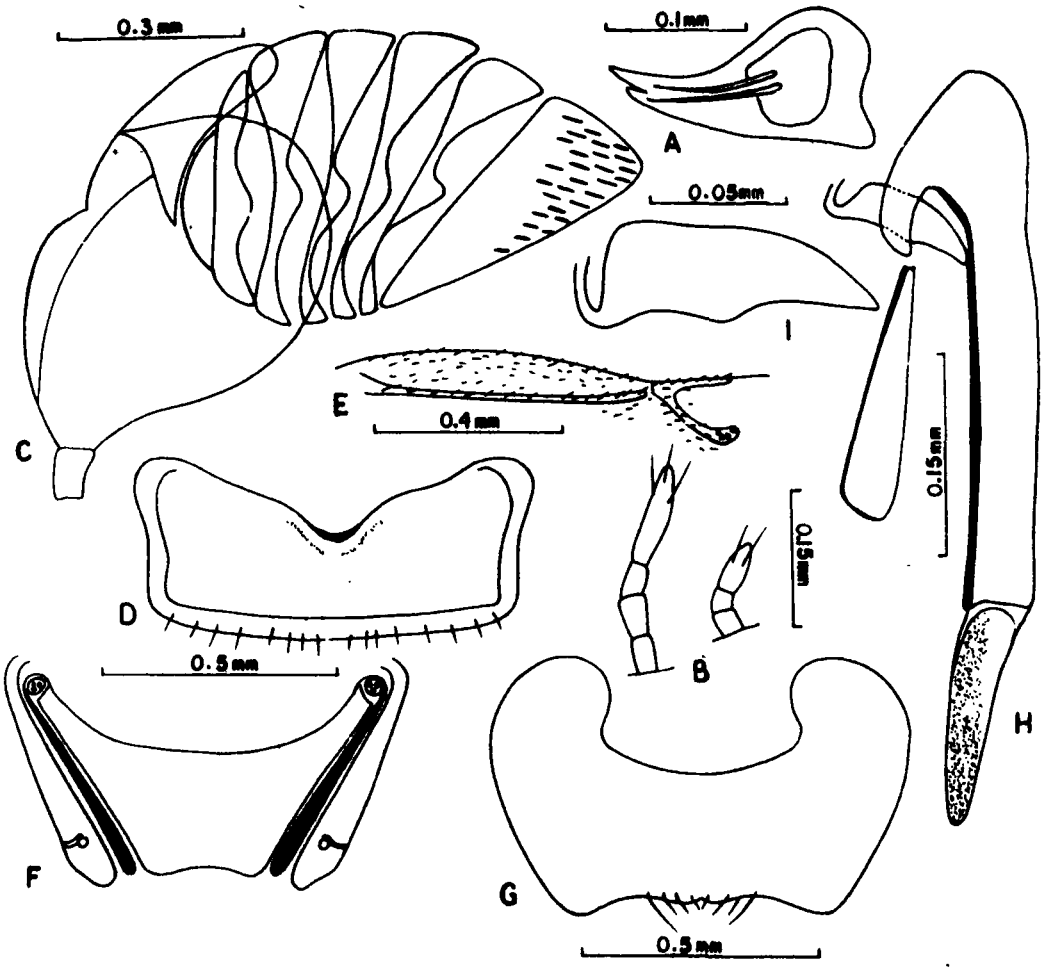

Fig. 3

2. Genus Blepyrus Howard, 1898

Bleypyrus Howard, 1898b:233.

Type-species: Blepyrus mexicanus Howard, by designation of Ashmead, 1900a.

Coccophoctonus Ashmead, 1900b:375.

Type-species: Coccophoctonus dactylopii Ashmead, by monotypy and original designation.

Diagnosis: Head coarsely punctate; antennae (fig. 4A) with scape cylindrical, ring segment usually present, funicle 6-segmented, club 3-segmented; pronotum broad with posterior margin convex; fore wings (fig. 4B) hyaline, marginal vein distinctly longer than wide, subgenital plate (fig. 4D) semicircular, with well developed antero-lateral apodemes; tenth tergum (fig. 4C) narrow with paratergites broad at base and tapering apically; female genitalia (fig. 4E,F) with first valvifer having basal and apical angles at different planes, third valvulae short.

The genus is known to contain two species from India and a key for their separation is given below:

Key to Indian species of Blepyrus Howard, based on females

1. Axillae separated; ocelli in acute angled triangle; mandibles with all teeth pointed; antennae without ring segment, pedicel twice as long as wide .... i. insularis(Cameron)

- Axillae broadly contiguous; ocelli in right angled triangle; mandibles with teeth blunt; antennae with single ring segment, pedicel less than twice as long as wide... ..... ii. annulobliqus Kaul & Agarwal

i. Blepyrus insularis (Cameron)

Encyrtus insularis Cameron, 1886:243.

Blepyrus insularis (Cameron); Timberlake, 1922b:167

Host: Mealybugs

Distribution: INDIA: Delhi, Maharashtra, Tamilnadu, Uttar Pradesh.

ii. Blepyrus annulobliqus Kaul & Agarwal

(Fig. 4 A-F)

Blepyrus annulobliqus Kaul & Agarwal, 1985:50.

Material examined: 1 ♀. INDIA: Bihar, Ranchi, 10.ix.1986, by sweeping the grass, S.M. Shamim.

Host: Unknown

Distribution: INDIA: Gwalior, Ranchi.

Fig.4 A-F. Blepyrus annulobliqus Kaul & Agarwal, ♀

A. Antenna

B. Fore wing

C. Apical terga of abdomen

D. Subgenital plate

E. Part of external genitalia

F. First valvifer

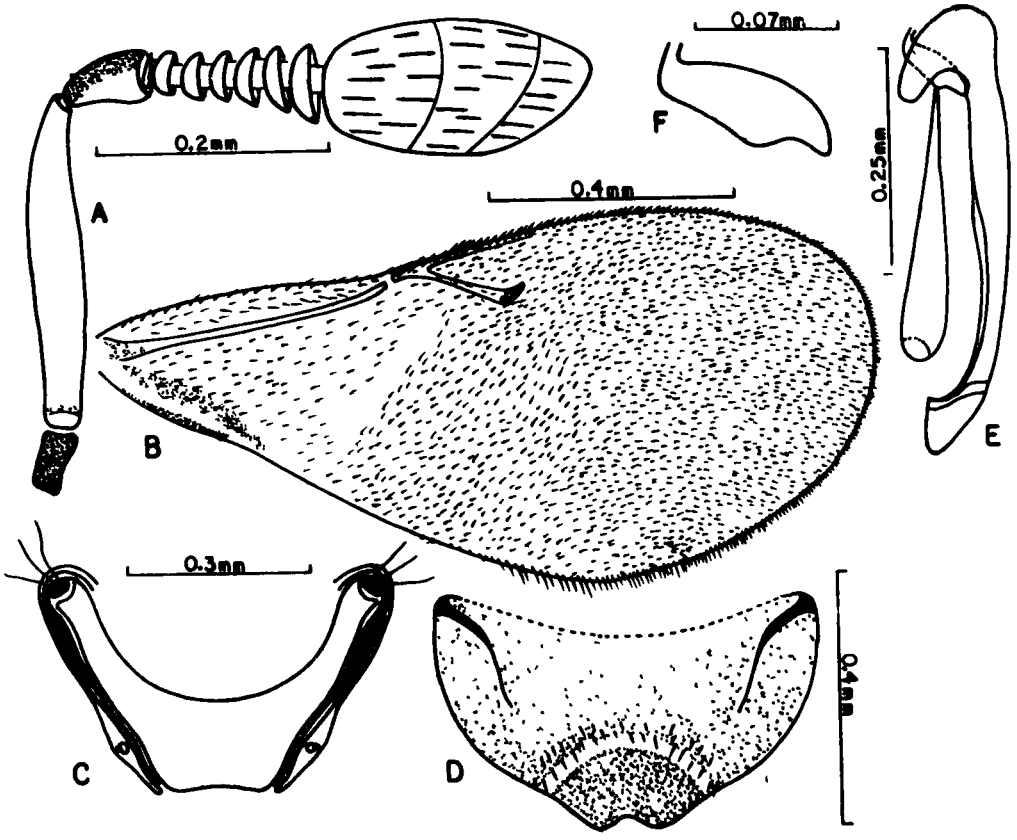

Fig. 4

3. Genus Aenasius Walker, 1846

Aenasius Walker, 1846:181.

Type-species: Aenasius hyettus Walker, by monotypy and original designation.

Pseudanasius Hayat, Alam and Agarwal, 1975:21.

Type-species: Pseudanasius clavus Hayat, Alam and Agarwal, by monotypy and original designation.

Diagnosis: Head coarsely punctate; antennae (fig. 5B) with scape strongly dilated, ring segment present, funicle and club well separated, club 3-segmented; pronotum (fig. 5C) broad with posterior margin convex; fore wings (fig. 5D) hyaline, marginal vein distinctly longer than wide, postmarginal vein slightly shorter than stigmal; subgenital plate semicircular, with well developed antero-lateral apodemes; tenth tergum (fig. 5F) narrow with paratergites broad at base and tapering apically; female genitalia (fig. 5G) with first valvifer having basal and apical angles at different planes, third valvulae short.

The genus is known to contain single species from India.

i. Aenasius advena Compere

(Fig. 5 A-G)

Aenasius advena Compere, 1937b:388.

Pseudanasius clavus Hayat, Alam and Agarwal, 1975:23.

Material examined: 2 ♀. INDIA: Kerala, Quilon, Kundara, ex Ferrisia virgata (Cockerell) on wild plant, 8.iii. 1967, S. Adam Shafee

Host: Ferrisia virgata (Cockerell)

Distribution: INDIA: Delhi, Goa, Kerala, Madhya Pradesh, Maharashtra, Punjab, Tamilnadu, Uttar Pradesh.

4. Genus Neodiscodes Compere, 1931

Neodiscodes Compere, 1931:272.

Type-species: Neodiscodes martinii Compere, by original designation.

Diagnosis: Head coarsely punctate; antennae (fig. 5I) with scape strongly dilated, ring segment absent, funicle and club well separated, club 3-segmented; pronotum (fig. 5J) broad with posterior margin convex; fore wings hyaline, marginal vein distinctly longer than wide, postmarginal vein slightly longer than stigmal; subgenital plate (fig. 5M) semicircular, with well developed anterolateral apodemes; tenth tergum (fig. 5L) very narrow, almost of uniform width, paratergites uniformly narrow and hair-like; female genitalia (fig. 5N) with first valvifer having basal and apical angles at different planes, third valvulae short.

The genus is known to contain three species from India and a key for their separation is given below:

Key to Indian species of Neodiscodes Compere, based on females

1. Antennal scape two and a half times longer than wide.....2
- Antennal scape two times longer than wide, club longer than pedicel and funicle combined, 2-5 basal segment of flagellum pale; fore wings twice the length of its greatest breadth ..... i. indicus Narayanan & Subba Rao
2. Head seen from above four times as wide as median length, frontovertex one-seventh of head width at the level of median ocellus; eyes bare; axillae broadly contiguous; scutellum sharply pointed; fore wings slightly longer than wide..... ii. simlaensis Kaul & Agarwal
- Head seen from above about twice as broad as median length; frontovertex one-eigth or more of head width at the level of median ocellus; eyes weakly and rather sparsely hairy; axillae widely separated; scutellum bluntly pointed; fore wings twice the length of its greatest breadth..... ..... iii. lepelleyi Kerrich

i. Neodiscodes indicus Narayanan & Subba Rao

(Fig. 5 H-O)

Neodiscodes indicus Narayanan & Subba Rao, 1960:75.

Material examined: 10 ♀. INDIA: Kerala, Quilon, Kundara, ex Planococcoides robustus Ezzat & McConnell on Artocarpus heterophyllus Lamk., 8.ii.1967 S. Adam Shafee

Hosts: Icerya formicarum Newstead

Nipaecoccus sp.

Nipaecoccus viridis (Newstead)

Planococcoides robustus Ezzat & McConnell

Distribution: Throughout India.

ii. Neodiscodes simlaensis Kaul & Agarwal

Neodiscodes simlaensis Kaul & Agarwal, 1985:60.

Host: Unknown

Distribution: India: Simla.

iii. Neodiscodes lepelleyi Kerrich

Neodiscodes lepellevi Kerrich, 1953:794

Host: Planococcus lilacinus (Cockerell)

Distribution: India: Bhubaneshwar.

Fig.5 A-G. *Aenasius advena* Compere, ♀

A. Mandible

B. Antenna

C. Pronotum

D. Fore wing

E. Part of fore wing venation

F. Apical terga of abdomen

G. Part of external genitalia

Fig.5 H-O. *Neodiscodes indicus* Narayanan & Subba Rao, ♀

H. Mandible

I. Antenna

J. Pronotum

K. Part of fore wing venation

L. Apical terga of abdomen

M. Subgenital plate

N. Part of external genitalia

O. First valvifer

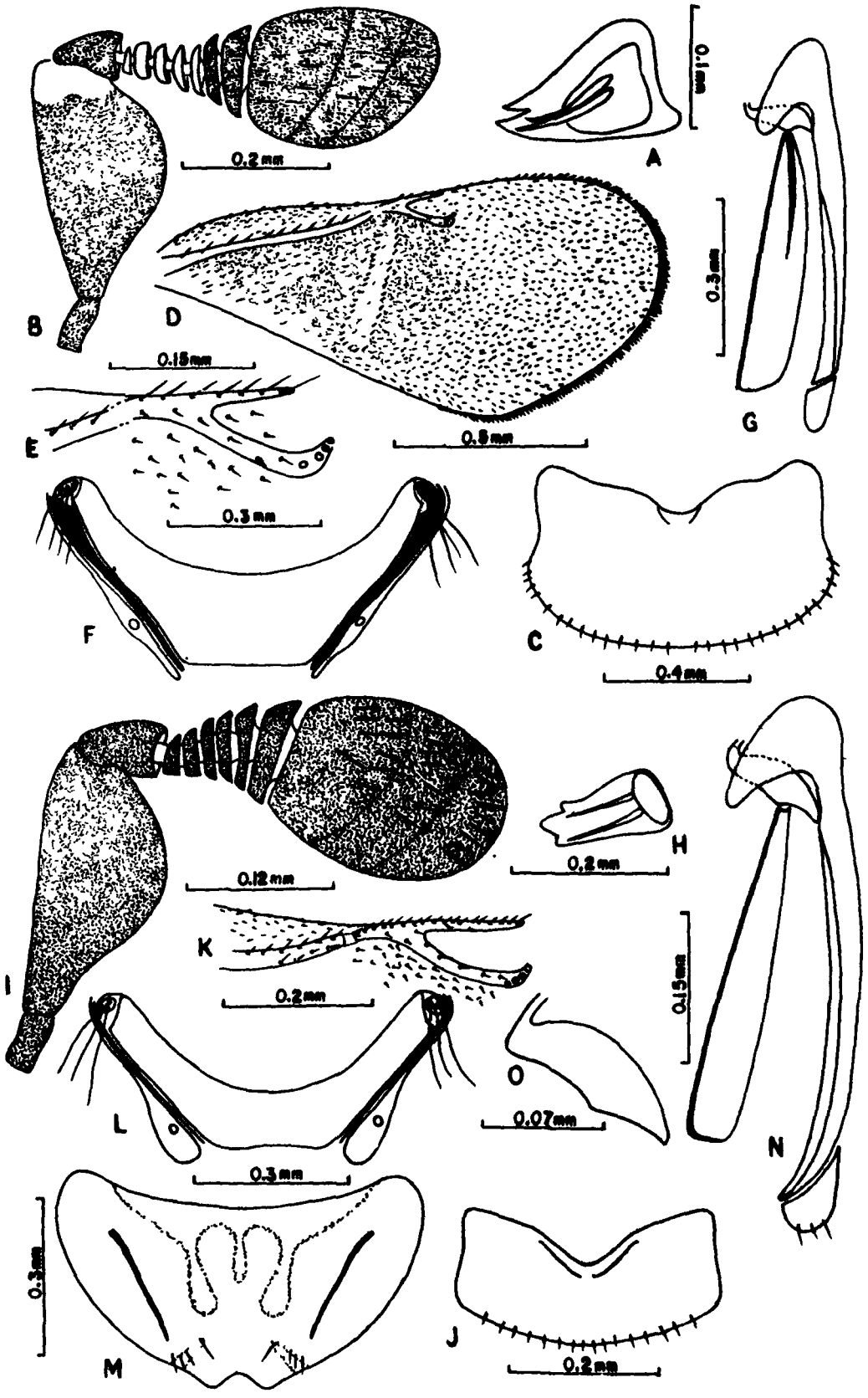
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Fig. 5

B. TRIBE TETRACNEMINI HOWARD

Tetracnemii Howard; Hoffer, 1955:14.

Tetracnemini, Erdos & Novicky, 1955:168.

Tetracnemini, Trjapitzin, 1973a:172.

Diagnosis: Body usually large, rarely medium to small size; usually sclerotized; head usually hypognathous, rarely subprognathous or prognathous; mandibles usually bidentate, rarely tridentate; maxillary palpi usually 4-segmented, rarely 3-segmented or 2-segmented; labial palpi usually 3-segmented, rarely 2-segmented or 1-segmented; antennae usually normal, rarely flattened; pronotum usually normal, rarely with a marked constriction in the middle; mesoscutum usually without parapsidal fufrows, rarely with parapsidal furrows; forewings usually with costal cell broad, rarely narrow; tenth tergum usually normal, sometimes enlarged, paratergites usually long and narrow, sometimes short and broad; female genitalia with third valvulae fused with second valvifers.

a. SUBTRIBE TETRACNEMINA HOWARD

Tetracnemii Howard; Hoffer, 1955:14.

Tetracnemini, Erdos & Novicky, 1955:168.

Tetracnemini, Trjapitzin, 1973a:172.

Tetracneminae, Trjapitzin, 1973a:169.

Tetracnemina, Trjapitzin, 1973a:172.

Diagnosis Body long, sclerotized, normal; head hypognathous; maxillary palpi 4-segmented, labial palpi 3-segmented; mandibles bidentate; antennae normal; pronotum normal; mesoscutum without parapsidal furrows; forewings with costal cell moderately broad, tenth tergum never much enlarged, paratergites short and narrow; female genitalia (fig. 6E) with third valvulae fused with second valvifers.

The subtribe is known to contain single genus Tetracnemus Westwood from India.

5. Genus Tetracnemus Westwood, 1837

Tetracnemus Westwood, 1837 :258

Type-species: Tetracnemus divercicornis Westwood, by monotypy.

Tetracladia Howard, 1892:367.

Type-species: Tetracladia texana Howard, designated by Ashmead, 1900.

Tetralophidea Ashmead, 1900a:348.

Type-species: Tetralophidea bakeri Ashmead, by monotypy and original designation.

Tetralophiellus Ashmead, 1900a:357.

Type-species: Tetralophiellus brevicollis Ashmead, by monotypy and original designation.

Paracalocerinus Girault, 1915a:142.

Type-species: Paracalocerinus australiensis Girault, by monotypy and original designation.

Masia Mercet, 1919:470.

Type-species: Masia bifasciatella Mercet, by monotypy and original designation.

Anusiella Mercet, 1923a:287.

Type-species: Anusia heydeni Mayr, by monotypy and original designation.

Placoceras Erdos, 1946a:1

Type-species: Placoceras calocense Erdos, by monotypy.

Comperencyrtus De Santis, 1963:106.

Type-species: Comperencyrtus maculipennis De Santis, by monotypy and original designation.

Diagnosis: Head dark, hypognathous; mandibles bidentate; maxillary palpi 4-segmented, labial palpi 3-segmented; antennae (fig. 6 A, H, J) normal, scape cylindrical, funicle 6-segmented,

segments as long as or wider than long, club 1-segmented. Thorax dark, mesoscutum without parapsidal furrows; propodeum long, with two sub-median carinae; fore wings (fig. 6B) infuscated except basal one-third and two semicircular areas beyond venation hyaline; submarginal vein long, marginal vein distinctly longer than stigmal, postmarginal vein well developed or rudimentary; tenth tergum (fig. 6D) small, paratergites present, slightly thickened basally; subgenital plate (fig. 6G) V-shaped, with well developed antero-lateral apodemes; female genitalia (fig. 6E) with second valvifers very narrow medially, with a long finger-like prolongation apically; outer plate with an apical sickle-like prolongation.

The genus is known to contain six species from India, two were based on males. Tetracnemus bifasciatella Mercet being reported for the first time from India. A key to Indian species based on females is given below:

Key to Indian species of Tetracnemus Westwood, based on females

1. Fore wings (fig. 6C) with postmarginal vein well developed, scape five times as long as wide.....2
- Fore wings (fig. 6 I,K) with postmarginal vein rudimentary or absent 3
2. Antennae (fig. 6A) with funicle segments 1-3 slightly longer than wide, 4-6 wider than long; club distinctly shorter than

funicle; fore wings with postmarginal vein as long as stigmal vein, one-seventh the length of marginal vein .... i. bifasciatella Mercet

- Antennae with funicle segments 1-6 distinctly wider than long; club longer than funicle; fore wings with postmarginal vein shorter than stigmal vein, about one-sixth the length of marginal vein..... ii. deccanensis (Mani & Kaul)

3. Antennae (fig. 6H) with scape slightly more than four times as long as wide; pedicel as long as following two funicle segments together; funicle segments 3-6 three times or more as wide as long..... iii. terebratus sp.n.

- Antennae (fig. 6J) with scape six times as long as wide; pedicel longer than following two funicle segments together; funicle segments 3-6 two times as wide as long..... iv. halimi sp.n.

i. Tetracnemus bifasciatella Mercet

(Fig.6A-G)

Masia bifasciatella Mercet, 1919:470

Material examined: 1♀, INDIA: Bihar, Hazaribagh, by sweeping vegetation, 17.iv.1983, S.M. Shamim.

Host: Unknown

Distribution: INDIA: Hazaribagh.

ii. Tetracnemus deccanensis (Mani & Kaul)

Calocerinus indicus Mani & Kaul, 1973:66. Preoccupied by Ayyar, 1932.

Masia deccanensis Mani & Kaul, 1974:65.

Tetracnemus deccanensis (Mani & Kaul); Noyes & Hayat, 1984:342.

Host: Pseudococcid

Distribution: INDIA: Khandala.

iii. Tetracnemus terebratus sp.n.

(Fig. 6 H-1)

Female

Head dark, about as long as wide in facial view; malar space about as long as eye width; antennae inserted near oral margin, inter-antennal space slightly less than one-half the width of frons between eyes at median ocellus; mandibles bidentate. Antennae (fig. 6H) dark except scape yellowish brown; scape eylindrical, slightly more than four times as long as wide; pedicel slightly longer than wide, as long as following two funicle segments together; funicle segments 1-6 distinctly wider than long, first slightly less than twice as long as wide, sixth three times as wide as long; club entire, more than twice as long as wide, longer than funicle.

Thorax dark; mesoscutum and scutellum reticulately sculptured, mesoscutum entire, without parapsidal furrows; axillae triangular, meeting medially; scutellum as long as wide; propodeum long with two submedian carinae. Fore wings infuscated except basal one-third and two semicircular areas beyond venation hyaline; slightly less than four times as long as wide; costal cell distinctly longer than marginal vein; postmarginal vein rudimentary, stigmal vein short, about one-fifth the length of marginal vein (fig. 61); speculum complete; hyaline areas with fine setae; marginal fringe short, spaced by a distance equal to one-third their length. Legs orange yellow except coxae, trochanters, femora of middle and hind legs, apical three-fourth of hind tibiae dark brown; mid tibial spur as long as basitarsus.

Abdomen dark, longer than thorax; ovipositor much exerted; paratergites narrow, tenth tergum short.

Body length: 1.27 mm.

Holotype ♀, INDIA: Bihar, Patna, by sweeping the vegetation, 10.ix. 1983, S.M. Shamim.

Comments: Tetracnemus terebratus sp. n. is closely related to Tetracnemus bifasciatella (Mercet), but differs from it for having antennae with funicular sgments much wider than long and fore wings with postmarginal vein rudimentary.

iv. *Tetracnemus halimi*[+] sp.n.

(Fig. 6J-K)

Female

Head dark, about as long as wide in facial view; malar space about as long as eye width; antennae inserted near oral margin; inter-antennal space slightly less than one-half the width of frons between eyes at median ocellus; mandibles bidentate. Antennae (fig. 6J) dark except scape yellowish brown; scape cylindrical, six times as long as wide; pedicel one and a half times as long as wide, longer than following two funicle segments together; funicle segments 1-6 wider than long, gradually widened distad; club entire, slightly more than twice as long as wide, shorter than funicle.

Thorax dark; mesoscutum and scutellum reticulately sculptured, mesoscutum entire, without parapsidal furrows; axillae triangular, meeting medially; scutellum as long as wide; propodeum long with two submedian carinae. Fore wings infuscated except basal one-third and two semicircular areas beyond venation, hyaline; slightly more than three times as long as wide; costal cell distinctly longer than marginal vein; postmarginal vein absent, stigmal vein short, less than one-sixth the length of marginal vein (fig. 6K); speculum complete;

+ The species is named after the name of my father Mr. Syed Mohammad Halim.

hyaline areas with fine setae; marginal fringe short, spaced by a distance equal to one-third their length. Legs orange yellow except coxae, trochanters, femora of middle and hind legs, apical three-fourth of hind tibiae dark brown; middle tibial spur as long as basitarsus.

Abdomen dark, longer than thorax, ovipositor much exerted; tenth tergum short, paratergites narrow.

Body length: 1.13 mm.

Holotype ♀, INDIA: Bihar, Ranchi, by sweeping the vegetation, 18.x. 1986, S.M. Shamim.

Comments: T.halimi sp.n. is closely related to T.terebratus sp.n., but differs from it in having the scape longer, funicle segments less wider than long, club shorter than funicle, and absence of the postmarginal vein.

v. Tetracnemus diversicornis Westwood

Tetracnemus diversicornis Westwood, 1837 :258

Tetracnemus diversicornis Westwood; Hayat, 1979b: 315-326.

Host: Pseudococcid

Distribution: INDIA: Rajasthan, Uttar Pradesh.

vi. Tetracnemus heterocornis Mani & Saraswat

Tetracnemus heterocornis Mani & Saraswat, 1974:75

Material examined. 1♀ BURMA: Tamu, 4.IV. 1987, by sweeping, M.S.A.K. Chishti

Host: Pseudococcid

Distribution: INDIA: Khandala.

Fig.6 A-G. Tetracnemus bifasciatella Mercet, ♀

A. Antenna

B. Fore wing

C. Part of fore wing venation

D. Apical terga of abdomen

E. Part of external genitalia

F. First valvifer

G. Subgenital plate

Fig.6 H-I. Tetracnemus terebratus sp. n., ♀

H. Antenna

I. Part of fore wing venation

Fig.6 J-K. Tetracnemus halimi sp. n., ♀

J. Antenna

K. Part of fore wing venation

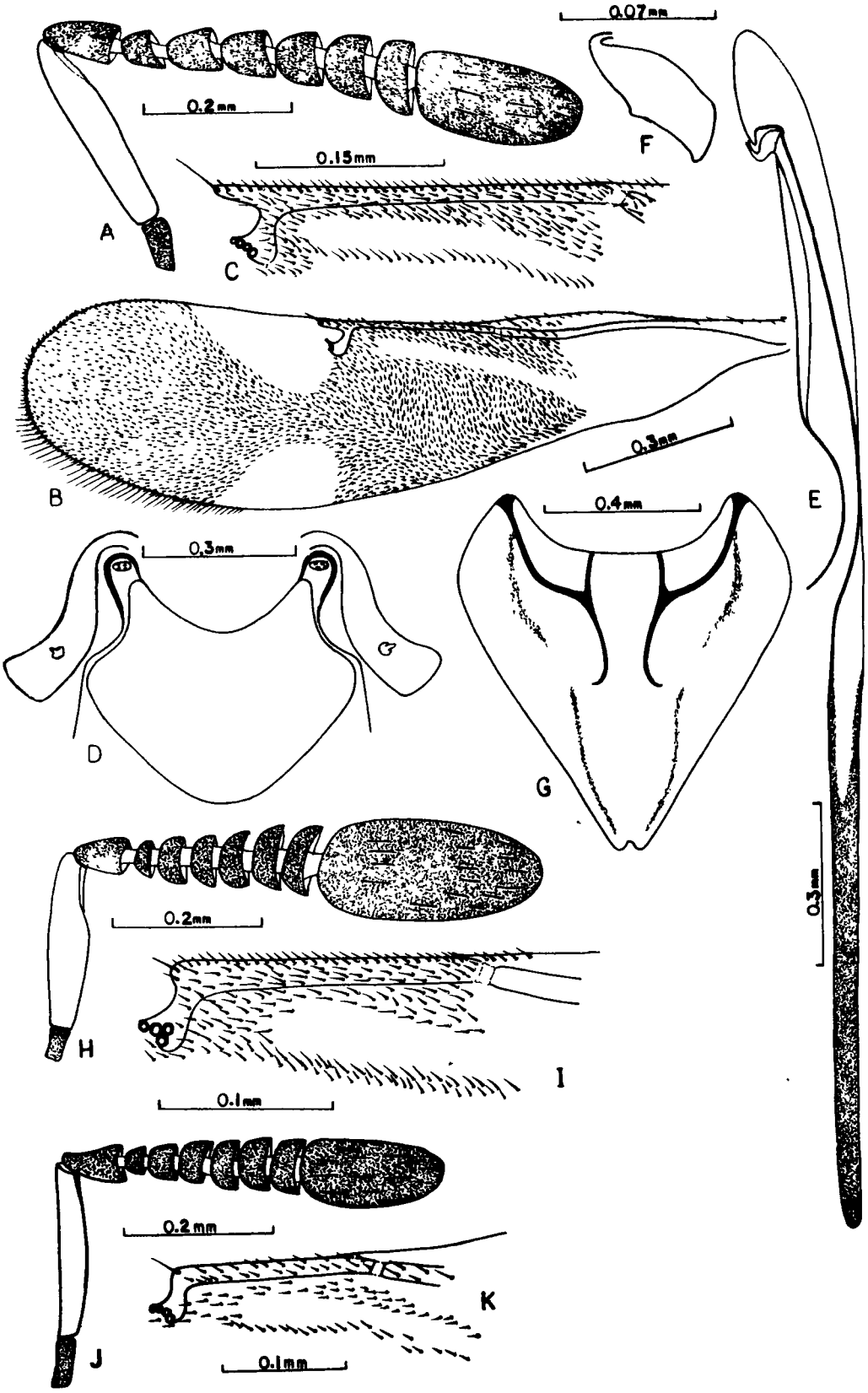
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Fig. 6

b. SUBTRIBE DINOCARSIINA HOFFER

Dinocarsiini Hoffer, 1953:85.

Dinocarsini, Trjapitzin, 1973a:170.

Dinocarsiina, Kerrich, 1967:145.

Diagnosis: Body large, usually sclerotized; head hypognathous; mandibles usually bidentate, rarely tridentate; maxillary palpi 4-segmented, labial palpi 3-segmented; antennae (fig. 7 B,J) completely flattened; pronotum (fig. 7C) normal; mesoscutum without parapsidal furrows; forewings usually with costal cell broad; tenth tergum (fig. 7F,N) moderately enlarged, paratergites long and broad; female genitalia (fig. 7H) with third valvulae fused with second valvifers.

The subtribe is known to contain two genera from India and their separation is given in the key to genera.

6. Genus Mira Schellenberg, 1803

Mira Schellenberg, 1803:68.

Type-species: Mira mucora Schellenberg, by monotypy.

Dicelloceras Menzel, 1855:270.

Type-species: Dicelloceras vibrans Menzel, by monotypy.

Euryscapus Foerster, 1856:32.

Type-species: Encyrtus platycerus Dalman, by original designation.

Lonchocerus Dahlbom, 1857:292

Type-species: Encyrtus platycerus Dalman, by subsequent reference of Thomson (1876:130).

Euzkadia Mercet, 1921:552.

Type-species: Euzkadia integralis Mercet, by original designation.

Diagnosis: Frontovertex as long as wide; mandibles (fig. 7I) tridentate with basal tooth short; maxillary palpi 4-segmented, labial palpi 3-segmented; antennae (fig. 7J) flattened; pedicel distinctly shorter than first funicle segment; funicle 6-segmented; club 3-segmented; pronotum (fig. 7K) conical, with deeply incised posterior margin; fore wings (fig. 7L) infuscated, costal cell narrow; marginal (fig. 7M) vein much longer than wide, postmarginal vein rudimentary; tenth tergum (fig. 7N) much enlarged, paratergites long and narrow; subgenital plate reaching apex of abdomen;female genitalia with second valvifer not of uniform width, third valvulae having a finger like prolongation apically.

The genus is a first report from India and is known to contain single species.

Mira ajmerensis sp.n.

(Fig. 7 I-N)

Female.

Head dark brown, slightly longer than wide in facial view;

ocelli red, arranged in equilateral triangle, lateral ocellus separated by its own diameter from inner orbital margin; eyes dark. Antennae (fig. 7J) yellowish brown, flattened, inserted near oral margin; scape one and a half times as long as wide, longer than pedicel and basal two funicle segments together; pedicel small, much shorter than first funicle segment; funicle segments 1-6 much wider than long; club 3-segmented, twice as long as wide, much narrower than funicle, shorter than preceding three funicle segments together.

Thorax dark brown, longer than abdomen; mesoscutum without parapsidal furrows; scutellum with a group of thick setae apically; axillae meeting medially. Fore wings (fig. 7L) infuscated, except basal one-third area beneath marginal vein and apical area hyaline, three times as long as wide; costal cell narrow; submarginal vein very long with 12 long setae, marginal vein slightly longer than stigmal vein, postmarginal vein rudimentary (fig. 7M); marginal fringe short, spaced by a distance equal to one-fourth their length. Hind wings hyaline, marginal fringe long, about one-half of wing width. Legs brown, long and slender; mid tibial spur as long as basitarsus.

Abdomen dark, shorter than thorax; ovipositor hidden, arising from basal one-third of abdominal venter; tenth tergum much

enlarged, paratergites long and narrow; subgenital plate reaching apex of abdomen; second valvifer not of uniform width, third valvulae having a finger-like prolongation apically, outer plate broad with thickened dorsal marginal ridge.

Body length: 1.16 mm.

Holotype ♀. INDIA: Rajasthan, Ajmer, 12.x.1985, by sweeping vegetation, M.A.K. Chishti.

Comments: The new species is related to Mira iberica Mercet, but differs from it for having antennal scape one and a half times as long as wide, fore wings with postmarginal vein rudimentary.

7. Genus Praleurocerus Agarwal, 1966

Paraleurocerus Agarwal, 1966:68.

Type-species: Paraleurocerus viridis Agarwal, by monotypy and original designation. Preoccupied by Girault, 1915.

Praleurocerus Agarwal, 1974:394.

Replacement name for Paraleurocerus Agarwal, not Girault.

Diagnosis: Body large, sclerotized; frontovertex much wider than long; mandibles (fig. 7A) bidentate; maxillary palpi 4-segmented, labial palpi 3-segmented; antennae (fig. 7B) flattened, pedicel usually as long as first funicle segment, funicle 6-segmented, club

1-segmented; pronotum (fig. 7C) broad with anterior margin concave, posterior margin convex; fore wings (fig. 7D) infuscated, costal cell broad, marginal vein (fig. 7E) longer than wide, distinctly shorter than stigmal vein, postmarginal vein rudimentary; tenth tergum (fig. 7F) moderately broad, paratergites long and widened medially; subgenital plate (fig. 7G) of uniform width without antero-lateral apodemes, with conical projection medially; female genitalia (fig. 7H) with second valvifers of uniform width, third valvulae blunt; outer plate broad with thickened outer marginal inflection.

The genus is known to contain five species from India. Kaul & Agarwal's (1985) key to species of Praleurocerus is reproduced below:

Key to Indian species of Praleurocerus Agarwal, based on females

1. Frons with scattered puntures; pedicel as long as first funicle segment; ocelli not in a right angled triangle 2
- Frons without puntation; pedicel shorter than first funicle segment, ocelli placed in a right angled triangle .... i. indicus Khan & Agarwal
2. Axillae contiguous 3
- Axillae broadly separated; club with a line at apical one-third, shorter than preceding four segments combined; postmarginal vein (fig. 7E) very short, one-eleventh of the marginal;

stigmal more than five times as long as marginal.....
.....ii. axilloseparatus Kaul & Agarwal

3. Axillae broadly contiguous 4

- Axillae narrowly contiguous; pedicel wider than long; scutellum extended much beyond the expanded portion of propodeum, postmarginal short, half of the marginal vein, stigmal eight times longer than postmarginal .....
..... iii. axillaria Khan

4. Frons more than two times wider than long, marginal two times as wide as long, postmarginal subequal to marginal, stigmal five times longer than postmarginal .....
..... iv. viridis Agarwal

- Frons more than four times wider than long; marginal vein three times as wide as long, postmarginal about one-third of the marginal; stigmal nine times as long as postmarginal.....
..... v. frontolatus Kaul & Agarwal

i. Praleurocerus indicus Khan & Agarwal

Praleurocerus indicus Khan & Agarwal, 1976b:165.

Hosts: Planococcoides robustus Ezzat & McConnell
Rastrococcus iceryoides (Green)

Distribution: INDIA: Aligarh.

ii. Praleurocerus axilloseparatus Kaul & Agarwal

(Fig. 7 A - H)

Praleurocerus axilloseparatus Kaul & Agarwal, 1985:67

Material examined: 1 ♀, INDIA: Bihar, Ranchi, by sweeping vegetation, 3.xi. 1986, S.M. Shamim.

Host: Scale insects

Distribution: INDIA: Pantnagar, Ranchi.

iii. Praleurocerus axillaria Khan

Praleurocerus axillaria Khan; Kaul & Agarwal, 1985:64.

Host: Scale insects

Distribution: INDIA: Aligarh.

iv. Praleurocerus viridis (Agarwal)

Paraleurocerus viridis Agarwal, 1966:68.

Praleurocerus indicus Khan & Agarwal, 1976b:165.

Hosts: Planococcoides robustus Ezzat & McConnell

Rastrococcus iceryoides (Green)

v. Praleurocerus frontolatus Kaul & Agarwal

Praleurocerus frontolatus Kaul & Agarwal, 1985:64.

Hosts: Scale insects

Distribution: INDIA: Aligarh.

Fig.7 A-H. Praleurocerus axilloseparatus Kaul & Agarwal, ♀

A. Mandible

B. Antenna

C. Pronotum

D. Fore wing

E. Part of fore wing venation

F. Apical terga of abdomen

G. Subgenital plate

H. Part of external genitalia

Fig.7 I-N. Mira ajmerensis sp. n., ♀

I. Mandible

J. Antenna

K. Pronotum as seen from above

L. Fore wing

M. Part of fore wing venation

N. Apical terga of abdomen

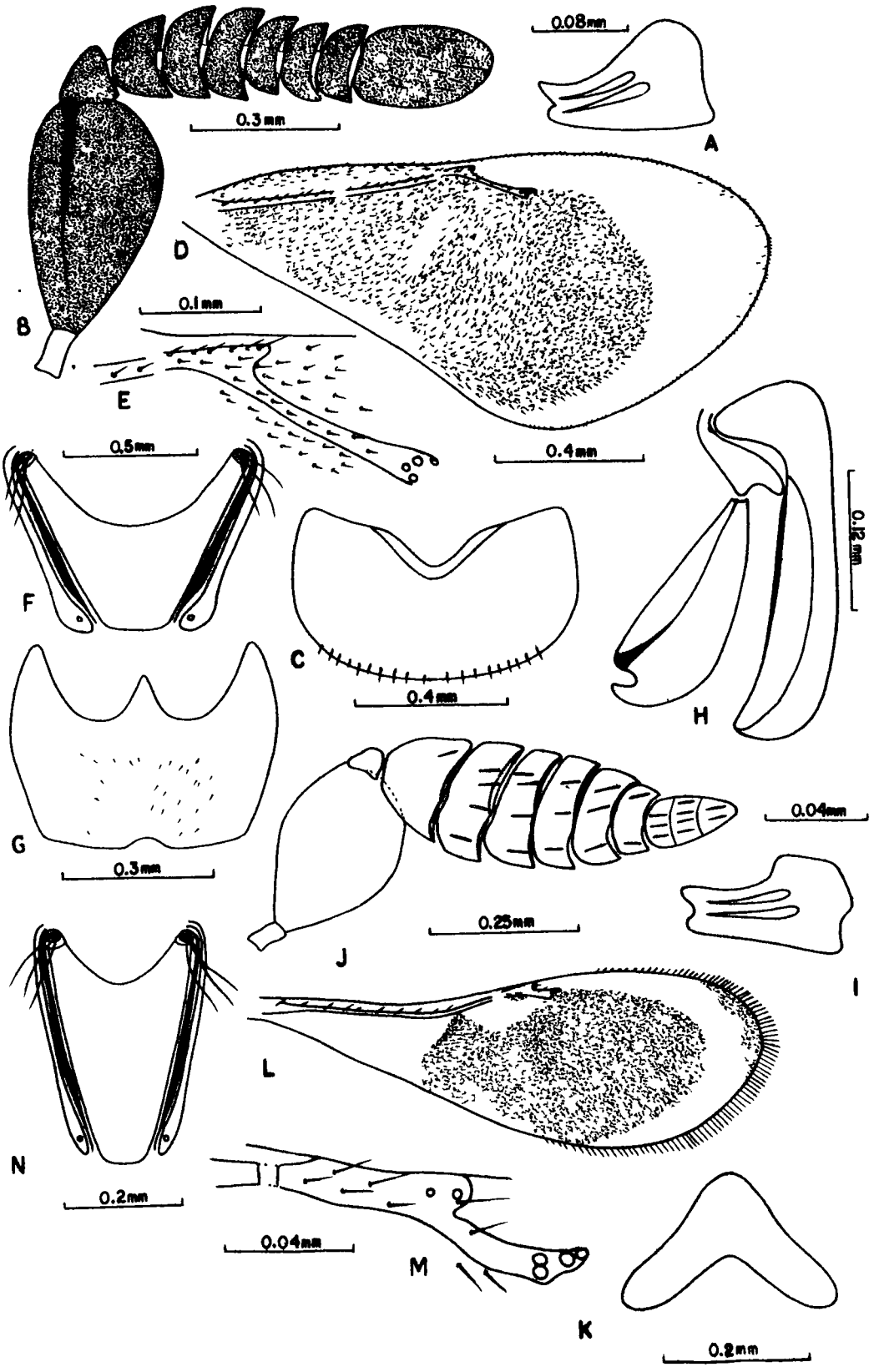
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Fig. 7

c. SUBTRIBE CHARITOPODINA TRJAPITZIN

Charitopodina Trjapitzin, 1973a:169.

Diagnosis: Body of medium size, never flattened; head hypognathous; mandibles usually tridentate rarely bidentate; maxillary palpi 3 to 4-segmented, labial palpi 2 to 3-segmented; antennae normal, never flattened; pronotum normal; mesoscutum with parapsidal furrows; forewings with costal cell moderately broad; tenth tergum (figs. 8 D; 9 M; 11 D; 12 D,L) never enlarged, paratergites short and narrow; female genitalia (figs. 9 O; 10E; 11E,M; 12 E,M) with third valvulae fused with second valvifers, first valvifers (figs. 9 P; 10 F; 11 F,N; 12 F) with a prolongation basally.

The subtribe is known to contain five genera from India and their separation is given in the key to genera.

8. Genus Sakencyrtus Hayat, 1981

Sakencyrtus Hayat, 1981a:27.

Type-species: Sakencyrtus mirus Hayat, by monotypy and original designation.

Diagnosis: Head yellow, sub-prognathous; mandibles tridentate, with median tooth long; maxillary palpi 3-segmented, labial palpi 2-segmented; antennae (fig. 8 A) normal, scape more or less

cylindrical, funicle 6-segmented, segments wider than long, club 3-segmented. Thorax yellow, pronotum long, mesoscutum with vestigeal parapsidal furrows; propodeum long; fore wings (fig. 8 C) hyaline, reduced or well developed; tenth tergum (fig. 8 D) moderately enlarged, paratergites narrow; subgenital plate (fig. 8 E) semicircular, antero-lateral apodemes well developed.

Comments: Noyes and Hayat (1984) placed the genus Sakencyrtus Hayat under the tribe Miraini. A careful study of the type species Sakencyrtus mirus Hayat revealed that it possesses certain characters viz., presence of parapsidal furrows on mesoscutum, tridentate mandibles and the shape of tenth tergum which has affinity with charitopodina. Therefore,the present author shifted the genus from Miraini to Charitopodina. The genus is known to contain single species from India.

1. Sakencyrtus mirus Hayat

(Fig. 8 A-E)

Sakencyrtus mirus Hayat, 1981a:28.

Material examined: 2 ♀ Paratypes labelled; INDIA: Uttar-Pradesh, Aligarh, 2.x.1979, M. Hayat; 20.x.1979 M. Hayat.

Host: Unknown

Distribution: INDIA: Uttar Pradesh.

Fig.8 A-E. Sakencyrtus mirus Hayat, ♀

A. Antenna

B. Pronotum

C. Fore wing

D. Apical terga of abdomen

E. Subgenital plate

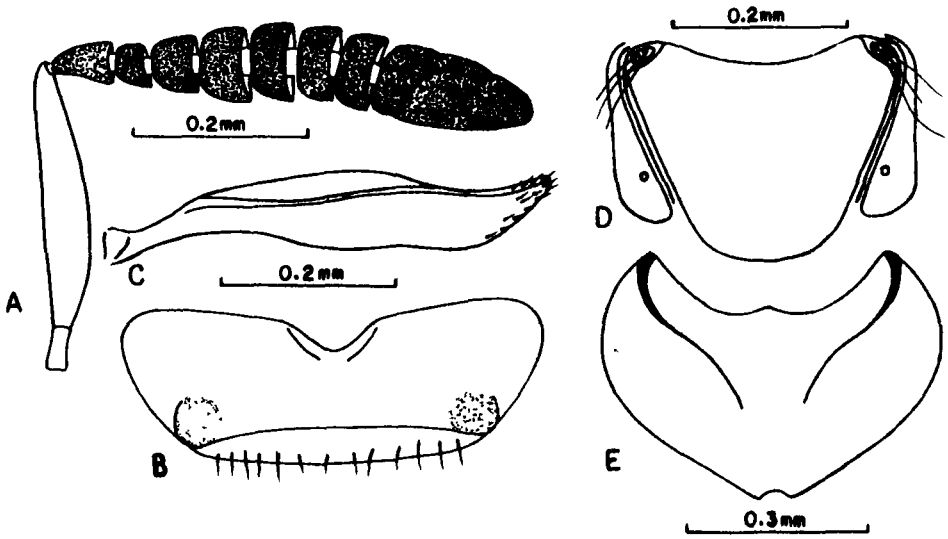

Fig. 8

9. Genus Eotopus Noyes & Hayat, 1984

Eotopus Noyes & Hayat, 1984:269.

Type-species: Ericydnus beneficus Shafee, by monotypy and original designation.

Diagnosis: Head dark, hypognathous; mandibles (fig. 9 A) tridentate, with median tooth long; maxillary palpi 3-segmented; labial palpi 2-segmented; (fig. 9 B) antennae (fig. 9 C,G) normal, scape cylindrical, funicle 6-segmented, segments as long as or longer than wide, club 3-segmented. Thorax dark, pronotum (fig 9 D) with posterior margin straight; mesoscutum with distinct parapsidal furrows anteriorly; propodeum long;fore wings hyaline, submarginal vein slightly dilated at apical one-third, postmarginal vein (fig. 9 E,H) well developed; tenth tergum small, paratergites narrow; subgenital plate (fig. 9 F) semicircular with distinct antero-lateral apodemes.

The genus is known to contain two species from India and a key for their separation is given below:

Key to Indian species of Eotopus Noyes & Hayat, based on females

1. Antennae (fig. 9 C) uniformly dark brown; marginal vein (fig.9E) touching wing margin, postmarginal vein as long as stigmal vein ... . i. beneficus (Shafee)

- Antennae (fig. 9 G) dark except apical half of scape and pedicel completely white; marginal vein (fig. 9 H) separated from wing margin, postmarginal vein slightly less than one-half the length of stigmal vein .. ii. albipedicellus (Shamim & Shafee) comb. n.

i. Eotopus beneficus (Shafee)

(Fig. 9 A-F)

Ericydnus beneficus Shafee, 1981:57.

Eotopus beneficus (Shafee); Noyes & Hayat, 1984:270.

Material examined: ♀ holotype labelled: INDIA: Bihar, Darbhanga, Pusa, ex Icerya pilosa Green on Saccharum officinarum Linn., 8.xi.1970, S. Adam Shafee.

Host: Icerya pilosa Green

Distribution: INDIA: Darbhanga.

ii. Eotopus albipedicellus (Shamim & Shafee) comb.n.

(Fig. 9 G-H)

Ericydnus albipedicellus Shamim & Shafee, 1984:25.

Material examined: ♀ holotype labelled: INDIA: Bihar, Champaran, Motihari, ex Icerya pilosa Green on Saccharum officinarum Linn., 28.vi.1983, S.M. Shamim.

Host: Icerya pilosa Green

Distribution: INDIA: Champaran.

10. Genus Manicnemus Hayat, 1981

Manicnemus Hayat, 1981a:23.

Type-species: Tetralophidea indica Mani & Saraswat, by original designation.

Diagnosis: Head dark, hypognathous; mandibles (fig. 9 I) tridentate, with median tooth long; maxillary palpi 4-segmented labial palpi 3-segmented; antennae (fig. 9 J) normal, scape cylindrical, funicle 6-segmented, segments longer than wide, club 3-segmented. Thorax dark, mesoscutum with parapsidal furrows in anterior half; propodeum long;fore wings hyaline, with a distinct transverse infuscated band medially, submarginal vein slightly dilated at apical one-third, marginal vein longer than postmarginal vein, tenth tergum (fig. 9 M) small, paratergites narrow and hair-like; subgenital plate (fig. 9 N) with posterior margin much reduced, anterolateral apodemes well developed; female genitalia (fig. 9 O) with second valvifer narrow medially, apex slightly dilated, first valvifer (fig. 9 P) with a prolongation basally.

The genus is known to contain single species from India.

i. Manicnemus indicus (Mani & Saraswat)

(Fig. 9 I-P)

Tetralophidea indica Mani & Saraswat, 1974:77.

Parablastothrix indicus Shafee, Alam & Agarwal, 1975:104.

Parablastothrix indica (Mani & Saraswat) Hayat, 1979b:320.

Manicnemus indicus (Mani & Saraswat); Hayat, 1981a:24.

Material examined: ♀ Paratype labelled: INDIA: Uttar - Pradesh, Aligarh, 26.ix.1979, Hayat & Verma.

Host: Greenaspis divergens (Green)

Distribution: INDIA: Maharashtra Uttar Pradesh, Rajasthan.

11. Genus Clausenia Ishii, 1923

Clausenia Ishii, 1923:98.

Type-species: Clausenia purpurea Ishii, by monotypy and original designation.

Paraclausenia Hayat, 1980:637. Syn.n.

Type-species: Paraclausenia herbicola Hayat, by monotypy and original designation.

Adektitopus Noyes & Hayat, 1984:221. Syn.n.

Type-species: Adektitopus gordhi Noyes & Hayat, by original designation.

Diagnosis: Head dark, hypognathous; mandibles (fig. 11 H,I) tridentate with median tooth long; maxillary palpi 4-segmented, labial palpi 3-segmented; antennae (figs. 10 A; 11 A,J) normal, scape cylindrical, funicle 6-segmented, segments as long as or longer than wide, club 3-segmented. Thorax dark, pronotum (fig. 11 B) concave

Fig.9 A-F. Eotopus beneficus (Shafee), ♀

A. Mandible

B. Maxillary & labial palpi

C. Antenna

D. Pronotum

E. Part of fore wing venation

F. Subgenital plate

Fig.9 G-H. Eotopus albipedicellus (Shamim & Shafee) ♀; comb.n.

G. Antenna

H. Part of fore wing venation

Fig.9 I-P. Manicnemus indicus (Mani & Saraswat), ♀

I. Mandible

J. Antenna

K. Pronotum

L. Part of fore wing venation

M. Apical terga of abdomen

N. Subgenital plate

O. Part of external genitalia

P. First valvifer

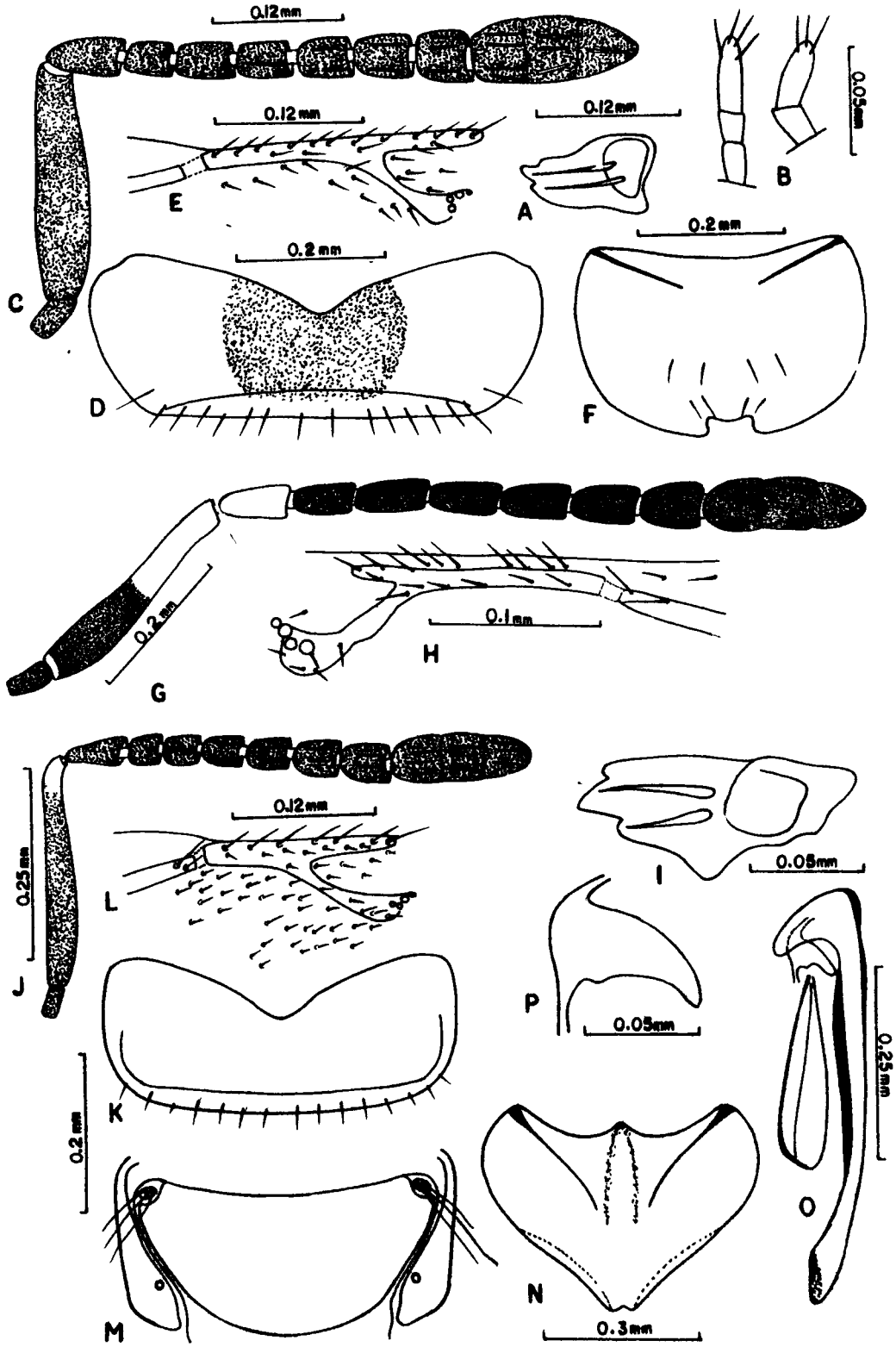
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Fig. 9

anteriorly and convex posteriorly; mesoscutum with distinct parapsidal furrows; propodeum almost of uniform width; fore wings hyaline, submarginal vein (figs. 10 B; 11 C,K) slightly dilated at apical one-third, marginal vein distinctly longer than stigmal, postmarginal vein well developed; tenth tergum (fig. 11 D) moderately enlarged, paratergites slightly thickened medially; subgenital plate (figs. 10 D; 11 G,L) boat-shaped, with well developed anterolateral apodemes; female genitalia (figs. 10 E; 11 E,M) with second valvifers narrow medially having finger-like prolongation apically; first valvifers (figs. 10 F; 11 F,N) with prolongation basally.

Comments: Noyes & Hayat (1984) separated their newly proposed genus Adektitopus with Paraclausenia Hayat on the basis of deep and shallow reticulate sculpture of scutellum. This character is only of specific value. A careful study of the types of Clausenia lacca (Agarwal) and Paraclausenia herbicola Hayat revealed that P. herbicola Hayat is junior synomym of C. lacca (Agarwal). The present author, therefore, synonymised the genera Adektitopus Noyes & Hayat and Paraclausenia Hayat with Clausenia Ishii.

The genus is known to contain two species from India and a key for their separation is given below:

Key to Indian species of Clausenia Ishii, based on females

1. Fore wings with marginal vein (fig. 10 B) as long as postmarginal and slightly longer than stigmal vein, antennae (fig. 10 A)

with scape 6 times as long as wide ..... i. lacca (Agarwal)

- Fore wings with marginal vein (fig. 11 C) much longer than postmarginal vein and more than twice the length of stigmal vein; antennae (fig. 11 A) with scape 9 times as long as wide ..... ii. longipennis Shafee & Avasthi

i. Clausenia lacca (Agarwal)

(Figs. 10 A-F; 11 I-N)

Lyka lacca Agarwal, 1962b:278.

Clausenia lacca (Agarwal); Boucek, 1977b:137-154.

Paraclausenia herbicola Hayat, 1980:639. Syn.n.

Clausenia indica Shafee & Avasthi, 1983:178. Syn.n.

Clausenia lacca (Agarwal); Noyes & Hayat, 1984:251.

Clausenia lacca (Agarwal); Hayat, 1986:89.

Material examined: ♀ holotype labelled: Lyka lacca Agarwal, INDIA: Uttar Pradesh, Aligarh, ex Laccifer lacca (Kerr) on Ficus religiosa Linn. 10.viii. 1960, M.M. Agarwal; ♀ holotype labelled: Paraclausenia herbicola Hayat, INDIA: Uttar Pradesh, Aligarh, 4.vi.1977, on grass, M. Hayat; ♀ holotype labelled: Clausenia indica Shafee & Avasthi, INDIA: Tamil Nadu,Coimbatore, ex Rastrococcus sp. on Acacia moniliformis, 27.iii. 1979, R.K. Avasthi.

Fig.10 A-F. Clausenia lacca (Agarwal), ♀ (Aligarh material)

A. Antenna

B. Part of fore wing venation

C. Part of middle leg

D. Subgenital plate

E. Part of external genitalia

F. First valvifer

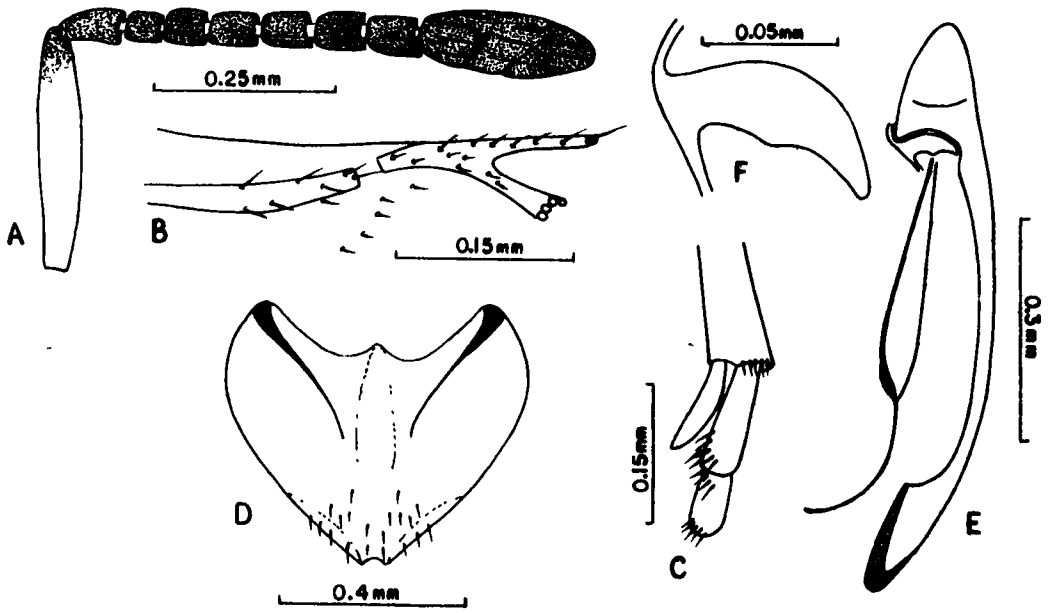

Fig. 10

Hosts: Laccifer lacca (Kerr)

Rastrococcus sp.

Distribution: INDIA: Aligarh, Coimbatore.

ii. Clausenia longipennis Shafee & Avasthi

(Fig. 11 A-H)

Clausenia longipennis Shafee & Avasthi, 1983:178.

Adektitopus gordhi Noyes & Hayat, 1984:222. Syn.n.

Material examined: ♀ holotype labelled: Clausenia longipennis Shafee & Avasthi, INDIA: Uttar Pradesh, Aligarh, ex Coccidohystrix insolitus (Green), on Solanum melongena Linn. 2.viii.1977, S. Adam Shafee; ♀ Paratype labelled: Adektitopus gordhi Noyes & Hayat, INDIA: Maharashtra, Elephanta, 28.x.1979, M. Hayat

Host: Coccidohystrix insolitus (Green)

Distribution: INDIA: Aligarh, Bombay (Elephanta).

12. Genus Charitopus Foerster, 1856

Charitopus Foerster, 1856:31.

Type-species: Charitopus fulviventris Foerster, by subsequent reference of Foerster, 1860:112.

Leptorhopala Motschulsky, 1863:60.

Type-species: Leptorhopala cuprifrons Motschulsky, by monotypy.

Fig.11 A-H. Clausenia longipennis Shafee & Avasthi, ♀

A. Antenna

B. Pronotum

C. Part of fore wing venation

D. Apical terga of abdomen

E. Part of external genitalia

F. First valvifer

G. Subgenital plate

H. Mandible

Fig.11 I-N. Clausenia lacca (Agarwal), ♀ (Coimbatore material)

I. Mandible

J. Antenna

K. Part of fore wing venation

L. Subgenital plate

M. Part of external genitalia

N. First valvifer

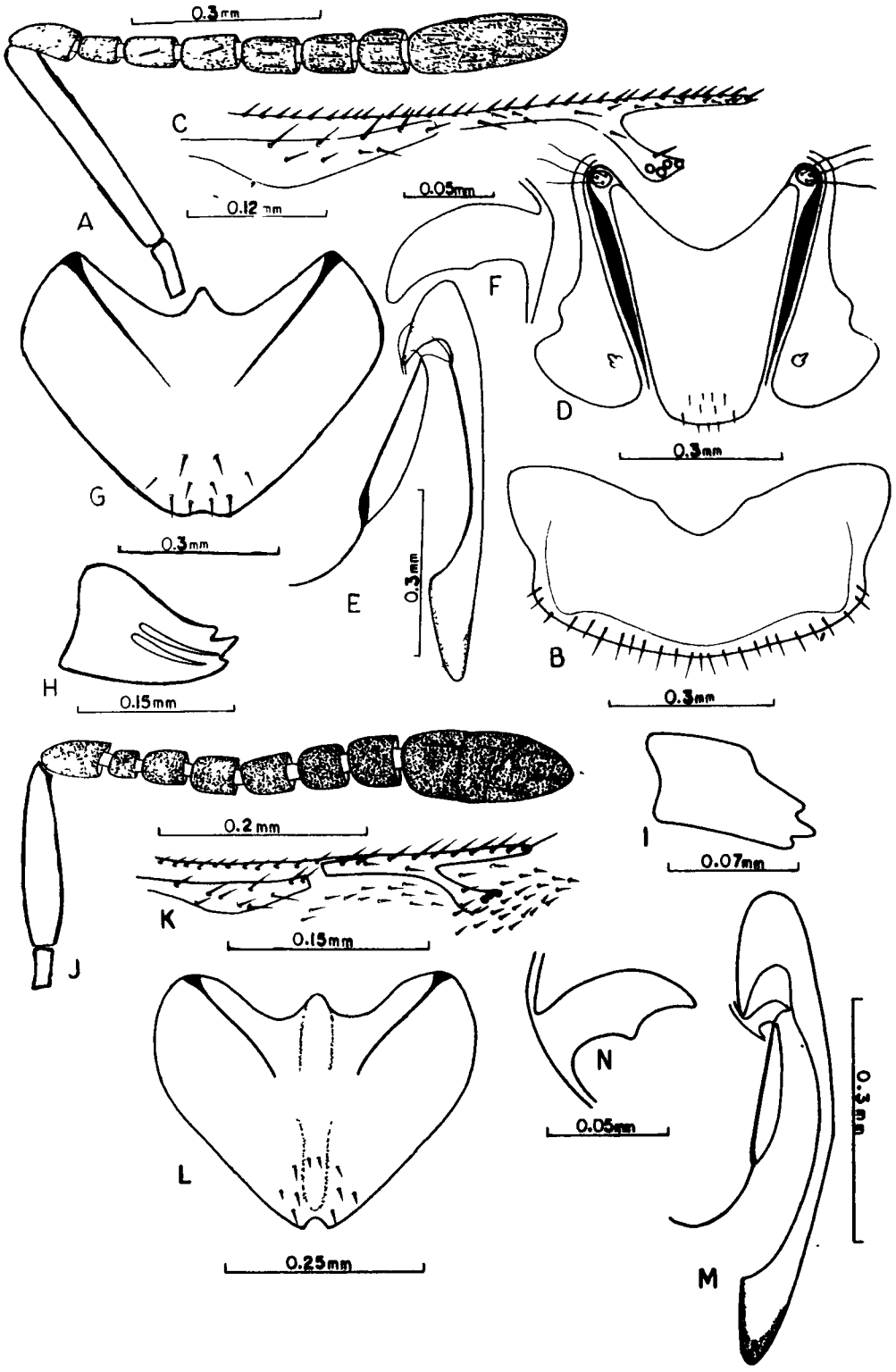
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Fig. 11

Eupelmomorpha Girault, 1915a:43.

Type-species: Eupelmomorpha quadricolor Girault, by designation of Gahan & Fagan, 1923.

Diversicornia Mercet, 1916c:371.

Type-species: Diversicornia pinicola Mercet, by monotypy and original designation.

Neocharitopus Hayat, Alam & Agarwal, 1975:24. Syn.n.

Type-species: Charitopus orientalis Agarwal, by monotypy and original designation.

Diagnosis: Head dark, hypognathous; mandibles (fig. 12 H) bidentate, with a minute tooth on outer margin; maxillary palpi 4-segmented, labial palpi 3-segmented; antennae (fig. 12 A,I) normal, scape cylindrical, funicle 6-segmented, segments about as long as wide, club 3-segmented. Thorax dark, pronotum (fig. 12 B,J) with concave anterior margin; mesoscutum with parapsidal furrows; propodeum almost of uniform width; fore wings hyaline, marginal vein longer than wide, postmarginal and stigmal veins well developed; tenth tergum (fig. 12 D,L) small, paratergites very narrow and hair-like; subgenital plate (fig. 12 G,N) semicircular, with antero-lateral apodemes; female genitalia (fig. 12 E,M) with second valvifers of uniform width, apex slightly dilated, first valvifers (fig. 12 F) with prolongation basally.

The genus is known to contain five species from India, three were based on males. A key to Indian species based on females is given below:

Key to Indian species of Charitopus Foerster, based on females

1. Antennae (fig. 12 A) with pedicel less than twice as long as wide; funicle segment first wider than long, shorter than second segment; club as long as preceding four funicle segments together fore wings with postmarginal vein as long as stigmal vein (fig. 12 C) ..... i. orientalis Agarwal

- Antennae (fig. 12 I)with pedicel more than twice as long as wide; funicle segment first longer than wide, as long as second; club as long as preceding three funicle segments together; fore wings with postmarginal vein shorter than stigmal vein (fig. 12 K) ..... ii. nigricorpus Shamim & Shafee

i. Charitopus orientalis Agarwal

(Fig. 12 A-G)

Charitopus orientalis Agarwal, 1965:91.

Neocharitopus orientalis (Agarwal); Hayat, Alam & Agarwal, 1975:26.

Material examined: ♀ holotype labelled: Charitopus orientalis Agarwal, INDIA: Uttar Pradesh, Aligarh, ex Chionaspidis sp. on

Rhynchosia mimosa Linn. 13.x.1956, M.M. Agarwal.

Host: Chionaspidis sp.

Coccidohystrix insolitus (Green)

Distribution: INDIA: Aligarh.

ii. Charitopus nigricorpus Shamim & Shafee

(Fig. 12 H-N)

Charitopus nigricorpus Shamim & Shafee, 1985a:36.

Material examined: ♀ holotype labelled: Charitopus nigricorpus INDIA: Bihar, Ranchi, Khunti, on vegetation, 6.x.1983, S.M. Shamim.

Host: Unknown

Distribution: INDIA: Ranchi.

iii. Charitopus apicatus (Mani & Saraswat)

Tetralophidea apicata Mani & Saraswat, 1974:79.

Charitopus apicatus (Mani & Saraswat); Hayat, 1979b:315-326.

Host: Unknown

Distribution: INDIA: Rajasthan, Tamil Nadu.

iv. Charitopus fulviventris Foerster

Charitopus fulviventris Foerster, 1860:112.

Charitopus fulviventris Foerster; Hayat, 1986:86.

Host: Unknown

Distribution: INDIA

v. Charitopus panchgania (Mani & Saraswat)

Diversicornia panchgania Mani & Saraswat, 1974:81.

Charitopus panchgania (Mani & Saraswat), Hayat, 1979b:315-326

Host: Unknown

Distribution: INDIA: Maharashtra, Uttar Pradesh.

Fig.12 A-G. Charitopus orientalis Agarwal, ♀

A. Antenna

B. Pronotum

C. Part of fore wing venation

D. Apical terga of abdomen

E. Part of external genitalia

F. First valvifer

G. Subgenital plate

Fig.12 H-N. Charitopus nigricorpus Shamim & Shafee, ♀

H. Mandible

I. Antenna

J. Pronotum

K. Part of fore wing venation

L. Apical terga of abdomen

M. Part of external genitalia

N. Subgenital plate

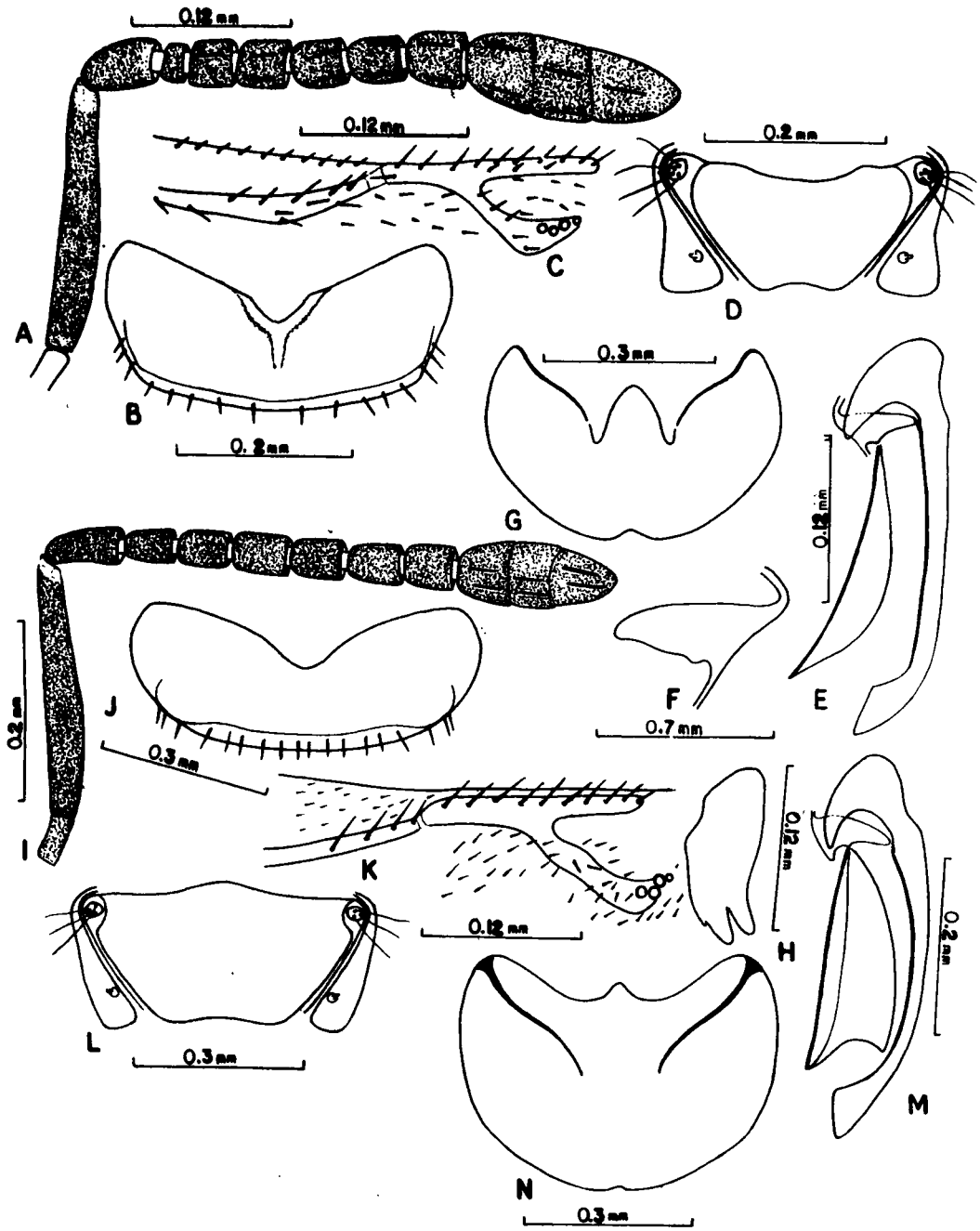
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Fig. 12

d. SUBTRIBE ANAGYRINA HOFFER

Anagyrii Hoffer, 1955:12.

Anagyrini Kerrich, 1967:145.

Anagyrini Trjapitzin, 1973a:170.

Anagyrina Kerrich, 1967:145.

Anagyrina Trjapitzin, 1973a:170.

Anomalicornini Hoffer, 1955:11. Syn.n.

Leptomastidini Erdos & Novicky, 1955:166.

Diagnosis: Body (fig. 14 A) of medium size, yellow to dark in colour, unsclerotized, usually normal, head usually hypognathous, rarely sub-prognathous; mandibles (fig. 14 C) usually bidentate; maxillary palpi 3 to 4-segmented, labial palpi 2 to 3-segmented; antennae normal, sometimes scape flattened; pronotum normal; mesoscutum without parapsidal furrows; forewings with costal cell moderately broad to narrow; tenth tergum (fig. 13 D; 15 D) much enlarged, paratergites long and narrow; female genitalia. (fig. 13 F; 14 G; 15 E) with third valvulae fused with second valvifers.

Comments: The genera Anagyrus Howard, Anomalicornia Mercet and Alamella Agarwal are closely related. Therefore, it is inevitable to place them under one group. The group name Anagyrina Hoffer

has page precedence over Anomalicornini Hoffer and hence the latter name is dropped.

The subtribe is known to contain sixteen genera from India and their separation is given in the key to genera.

13. Genus Metaphaenodiscus Mercet, 1921

Metaphaenodiscus Mercet, 1921:626.

Type-species: Metaphaenodiscus nemoralis Mercet, by monotypy and original designation.

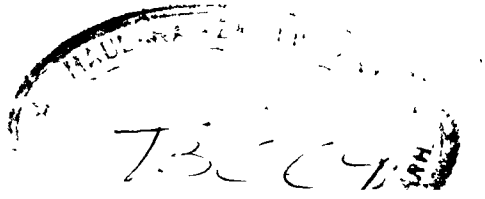
Keatsia Girault, 1928a:1.

Type-species: Keatsia umbilicata Girault, by monotypy.

Ramalia Ferriere, 1953:27.

Type-species: Tetralophidea maxima Mercet, by original designation.

Diagnosis: Head hypognathous; mandibles bidentate; maxillary palpi 4-segmented, labial palpi 3-segmented; antennae (fig. 13 A) normal, differently coloured, scape cylindrical, pedicel longer than first funicle segment, funicle 6-segmented, segments as long as or wider than long; club 3-segmented, fore wings (fig. 13 B) hyaline or slightly infuscated, costal cell broad, marginal vein (fig. 13 C) very long, postmarginal vein well developed, as long as or shorter



than stigmal; tenth tergum (fig. 13 D) moderately broad, posterior margin truncated, paratergites long and narrow; subgenital plate (fig. 13 E) semicircular with well developed antero-lateral apodemes; female genitalia (fig. 13 F) with second valvifers narrow, with finger-like prolongation apically, outer plate narrow with a sickle-shaped prolongation apically.

The genus is known to contain two species from India and a key for their separation is given below:

Key to Indian species of Metaphaenodiscus Mercet, based on females

1. Antennae with funicle segments 1-2 slightly longer than wide, segments 3-6 less than twice as wide as long; fore wings with postmarginal vein shorter than stigmal vein .....
..... i. aligarhensis Hayat

- Antennae with funicle segments 1-2 slightly wider than long, segments 3-6 about twice as wide as long; fore wings with postmarginal vein as long as stigmal vein .....
.....ii. nigropedicellus sp. n.

i. Metaphaenodiscus aligarhensis Hayat

Metaphaenodiscus aligarhensis Hayat, 1981a:25.

Host: Unknown

Distribution: INDIA: Aligarh.

ii. Metaphaenodiscus nigropedicellus sp.n.

(Fig. 13 A-G)

Female

Head dark with deep rounded punctures, punctures smooth with metallic bluish green reflections; frontovertex wider than long; eyes densely setose, ocelli arranged in slightly obtuse triangle, lateral ocellus separated by about its own diameter from inner orbital and occipital margins separately; mandibles bidentate. Antennae (fig. 13 A) yellowish, except radicle and pedicel dark; scape cylindrical; pedicel longer than first funicle segment; funicle segments 1-2 slightly wider than long, segments 3-6 almost twice as wide as long; club 3-segmented, less than three times as long as wide, as long as funicle.

Thorax dark with violet reflections; fore wings (fig. 13 B) hyaline with infuscation basally; less than two and a half times as long as wide, costal cell broad; marginal vein (fig. 13 C) very long, postmarginal vein as long as stigmal; speculum closed by a row of setae; marginal fringe short. Legs dark except apices of mid and hind femura, apices of fore and mid tibiae lightly infuscated, tarsi yellow, mid tibial spur dark brown.

Abdomen reddish brown, shorter than head and thorax combined; tenth tergum (fig. 13 D) moderately broad, apical margin almost

truncated, paratergites narrow; subgenital plate (fig. 13 E) semi-circular, with well developed antero-lateral apodemes; female genitalia (fig. 13 F) with first valvifers having basal and apical angles in one plane, second valvifers narrow medially, outer plate with a sickle-shaped prolongation apically.

Body length: 1.3 mm.

Holotype ♀, INDIA: Bihar, Ranchi, 2.v.1984; by sweeping the vegetation, S.M. Shamim.

Comments: The new species is closely related to M.aligarhensis Hayat but differs from it for having antennae with funicle segments 1-2 slightly wider than long, segments 3-6 about twice as wide as long; fore wings with postmarginal vein as long as stigmal and speculum closed by a row of setae.

14. Genus Anomalicornia Mercet, 1921

Anomalicornia Mercet, 1921:85.

Type-species: Anomalicornia tenuicornis Mercet, by monotypy and original designation.

Diagnosis: Head orange to light brown, sub-prognathous; mandibles bidentate; maxillary palpi 3-segmented, labial palpi

Fig.13 A-G. Metaphaenodiscus nigropedicellus sp. n., ♀

A. Antenna

B. Fore wing

C. Part of fore wing venation

D. Apical terga of abdomen

E. Subgenital plate

F. Part of external genitalia

G. First valvifer

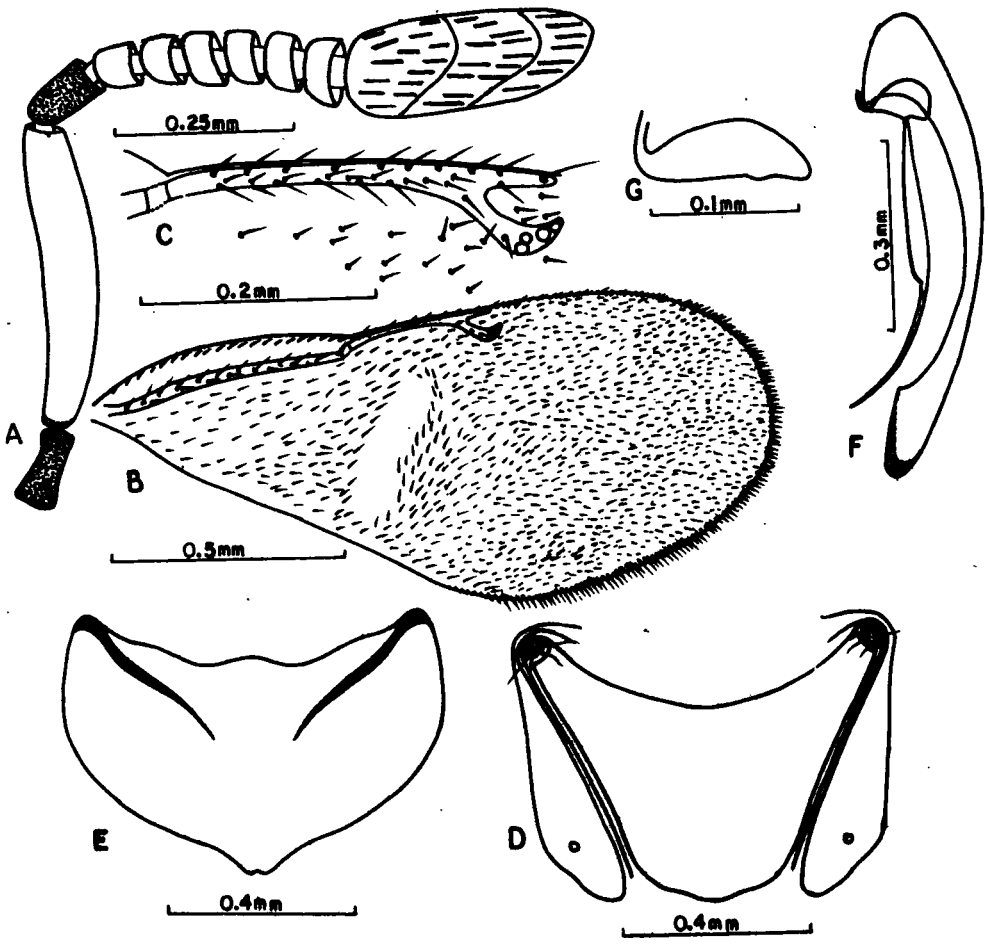


Fig. 13

2-segmented; antennae normal, scape cylindrical, pedicel distinctly shorter than first funicle segment, funicle 7-segmented, segments longer than wide, club 2-segmented; pronotum of uniform width with anterior margin concave, posterior margin convex; mesoscutum without parapsidal furrows; fore wings hyaline, costal cell narrow, marginal vein slightly longer than wide, postmarginal vein rudimentary, stigmal vein well developed and dilated apically; tenth tergum enlarged, paratergites long and narrow; subgenital plate semicircular without antero-lateral apodemes; female genitalia with second valvifers of uniform width.

The genus is known to contain single species from India.

1. Anomalicornia tenuicornis Mercet

Anomalicornia tenuicornis Mercet, 1921:86.

Host: Unknown

Distribution: India: Rajasthan.

15. Genus Alamella Agarwal, 1966

Alamella Agarwal, 1966:74.

Type-species: Alamella flava Agarwal, by monotypy and original designation.

Diagnosis: Head orange to light brown, hypognathous; mandibles (fig. 14 C) bidentate; maxillary palpi 3-segmented, labial palpi 2-segmented (fig. 14 B); antennae (fig. 14 A) normal, scape cylindrical, pedicel distinctly shorter than first funicle segment, funicle 7-segmented, segments longer than wide, club 2-segmented; pronotum (fig. 14 D) of uniform width with anterior margin concave , mesoscutum without parapsidal furrows; fore wings (fig. 14 A) hyaline, costal cell moderately broad; marginal vein longer than wide, postmarginal vein short, stigmal vein well developed; tenth tergum (fig. 14 A) enlarged, paratergites long and narrow; subgenital plate (fig. 14 F) semicircular without anterolateral apodemes; female genitalia (fig. 14 G) with second valvifers of uniform width, with imperceptible third valvulae, outer plate of uniform width.

Comments: The genus is closely related to Anomalicornia Mercet from which it can be separated by its having well developed condition of the stigmal vein of the forewing. The genus is known to contain single species from India.

i. Alamella flava Agarwal

(Fig. 14 A - H)

Alamella flava Agarwal, 1966:77.

Material examined: 4 ♀, INDIA: Uttar Pradesh, Aligarh University Campus, ex Nipaecoccus vastator (Maskell) on wild plant, 4.x. 1985, S.M. Shamim.

Hosts: Nipaecoccus sp.

Nipaecoccus vastator (Maskell)

Distiribution: INDIA: Aligarh, Tamil Nadu, Maharashtra, Himachal Pradesh, Haryana.

16. Genus Anomalencyrtus Hayat & Verma, 1980

Anomalencyrtus Hayat & Verma, 1980:341.

Type-species: Anomalencyrtus longicornis Hayat & Verma, by monotypy and original designation.

Diagnosis: Head dark brown, hypognathous; mandibles bidentate; maxillary palpi 3-segmented, labial palpi 2-segmented; antennae normal, scape slightly dilated, pedicel distinctly shorter than first funicle segment, funicle 6-segmented, segments longer than wide, club unsegmented; mesoscutum without parapsidal furrows; fore wings hyaline, costal cell moderately broad; marginal vein longer than wide, postmarginal vein well developed and as long as marginal vein, stigmal vein distinctly longer than marginal; tenth tergum enlarged, paratergites long and narrow; subgenital plate semicircular without anterolateral apodemes; female genitalia with second valvifers of uniform width.

The genus is known to contain single species from India.

Fig.14 A-H. *Alamella flava* Agarwal, ♀

A. Entire body

B. Maxillary & labial palpi

C. Mandible

D. Pronotum

E. Part of fore wing venation

F. Subgenital plate

G. Part of external genitalia

H. Male antenna

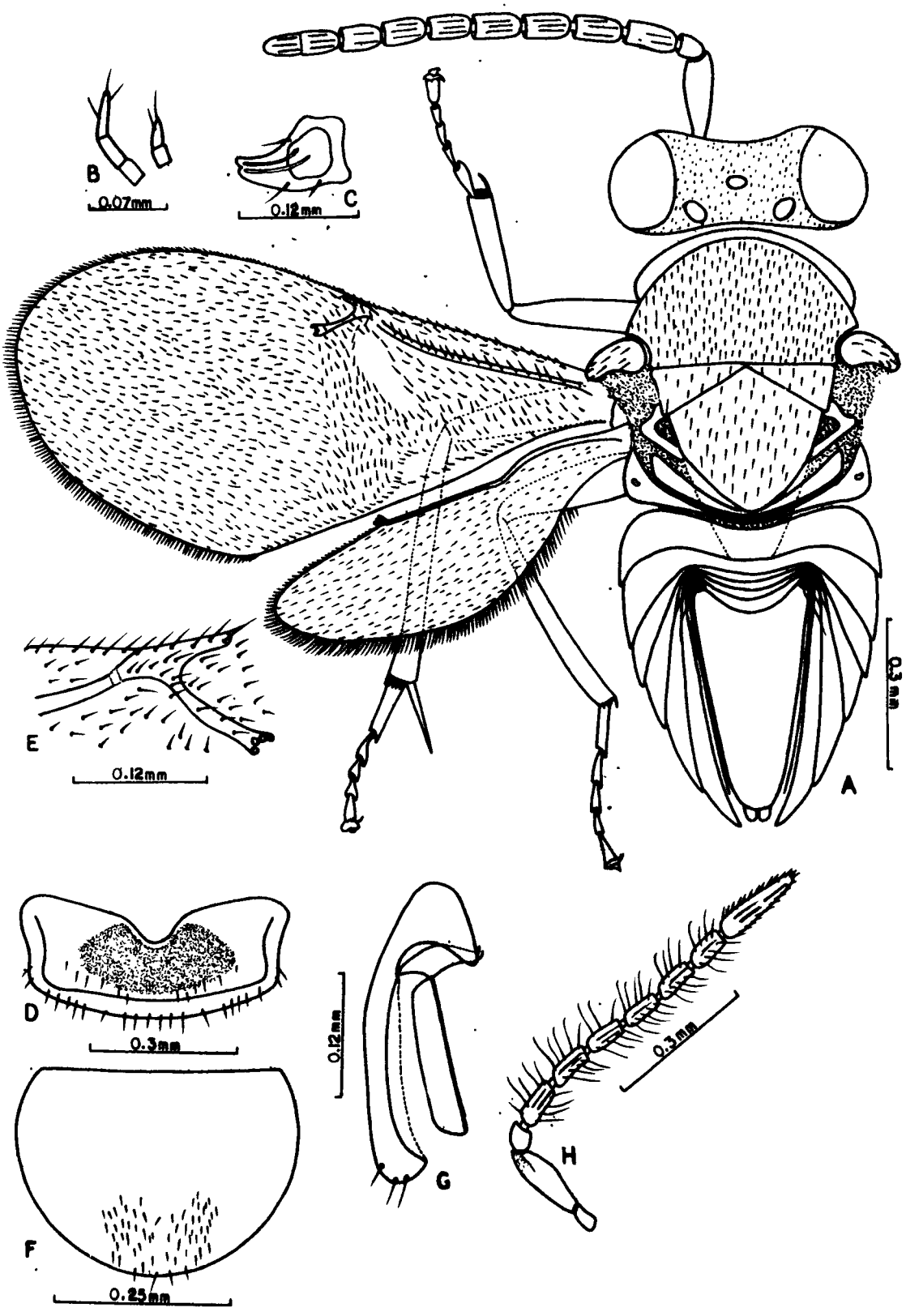


Fig. 14

1. Anomalencyrtus longicornis Hayat & Verma

Anomalencyrtus longicornis Hayat & Verma, 1980:344.

Host: Unknown

Distribution: INDIA: Aligarh.

17. Genus Callipteroma Motschulsky

Callipteroma Motschulsky, 1863:35.

Type-species: Callipteroma quinqueguttata Motschulsky, by designation of Ashmead, 1900.

Calocerinella Girault, 1913d:46.

Type-species: Calocerinella trifasciata Girault, by monotypy and original designation.

Vosleria Timberlake, 1926:1.

Type-species: Vosleria signata Timberlake, by monotypy and original designation.

Diagnosis: Head dark, hypognathous; mandibles bidentate; maxillary palpi 4-segmented, labial palpi 3-segmented; antennae (fig. 15 A) normal, scape cylindrical, pedicel distinctly shorter than first funicle segment, funicle 6-segmented, all segments much elongated, club 3-segmented; pronotum (fig. 15 B) moderately broad, anterior margin deeply concave, posterior margin with triangular

notch medially; mesoscutum without parapsidal furrows; fore wings (fig. 15 C) infuscated, with distinct bands of coarse and hyaline setae, costal cell absent, marginal vein much longer than wide, postmarginal vein as long as stigmal, stigmal vein dilated apically; tenth tergum (fig. 15 D) enlarged, paratergites long and narrow; subgenital plate semicircular without antero-lateral apodemes; female genitalia (fig. 15 E) with second valvifers of uniform width, third valvulae imperceptible, outer plate with a thickened dorsal marginal inflection.

The genus is known to contain two species from India and a key for their separation is given below:

Key to Indian species of Callipteroma Motschulsky based on females

1. Body testaceous; fore wings with at least one complete hyaline fascia; middle tibial spur never darker than basitarsus. .....

..... i. testacea Motschulsky

- Body dark; fore wings (fig. 15 C) without a complete hyaline fascia: hyaline areas restricted to spots; middle tibial spur usually darker than basitarsus. .....

..... ii. quinqueguttata Motschulsky

i. Callipteroma testacea Motschulsky

Callipteroma testacea Motschulsky, 1863:37.
Leptomastidea sayadriae (Mani & Kaul), 1974:70.

Host: Sugar cane mealy-bug

Distribution: INDIA: Madhya Pradesh, Maharashtra, Uttar Pradesh.

ii. Callipteroma quinqueguttata Motschulsky (Fig. 15 A-E)

Callipteroma quinqueguttata Motschulsky, 1863:36.
Callipteroma sexguttata Motschulsky, 1863:37.

Comments: Hayat (1986) treated quinqueguttata Motschulsky as synonym of sexguttata Motschulsky. In the present work quinqueguttata is recognised as valid since it has page precedence over sexguttata.

Material examined: 1♀, INDIA: Bihar, Palamau, Daltonganj, by sweeping the vegetation, 5.iv.1983, S.M. Shamim.

Host: Unknown

Distribution: Widely distributed in India.

Fig.15 A-E. Callipteroma quinqueguttata Motschulsky, ♀

A. Antenna

B. Pronotum

C. Fore wing

D. Apical terga of abdomen

E. Part of external genitalia

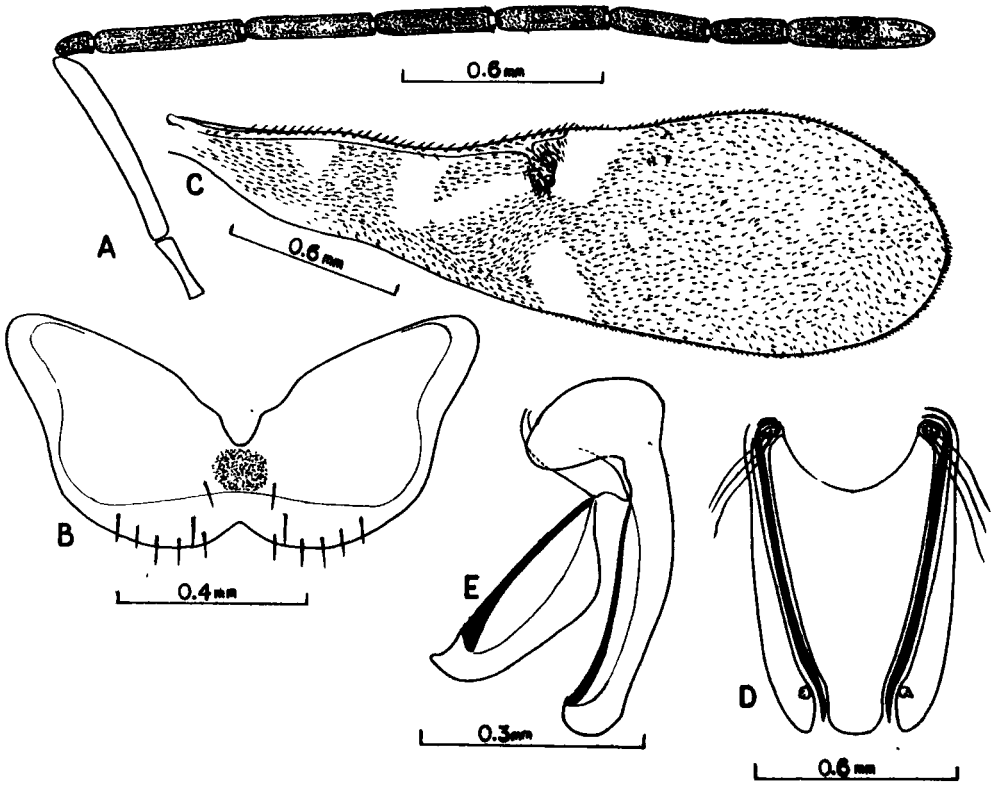


Fig. 15

18. Genus Leptomastix Foerster, 1856

Leptomastix Foester, 1856:34.

Type-species: Leptomastix histrio Mayr, by subsequent reference of Mayr, 1876:730.

Sterrhocoma Foerster, 1856:36.

Type-species: Sterrhocoma histrio Foerster, by monotypy and original designation.

Stenoterys Thomson, 1876:115.

Type-species: Stenoterys orbitalis Thomson, by monotypy.

Diagnosis: Body yellowish brown; head hypognathous; mandibles bidentate; maxillary palpi 4-segmented, labial palpi 3-segmented; antennae (figs. 16 A; 17 A,C,E,G,I,K,M,O,) normal, scape cylindrical, pedicel distinctly shorter than first funicle segment, funicle 6-segmented, all segments longer than wide, club 3-segmented; pronotum (fig. 16 B) of uniform width with anterior margin concave, posterior margin convex; mesoscutum without parapsidal furrows; fore wings hyaline, costal cell narrow, veins well developed, tenth tergum (fig. 16 D) enlarged, paratergites long and narrow; subgenital plate (fig. 16 F) semicircular without antero-lateral apodemes; female genitalia (fig. 16 E) with second valvifers of uniform width, third valvulae imperceptible, outer plate dilated apically.

The genus is known to contain ten species from India and a key for their separation given by Khan & Agarwal (1976a) is reproduced below:

Key to Indian species of Leptomastix Foerster, based on females

1. Middle coxae yellow 2
- Middle coxae black or brown 6
2. Scape as long as or shorter than basal two funicle segments combined 3
- Scape (fig. 17 C) longer than basal two funicle segments combined, first funicle segment less than three times as long as wide and slightly longer than pedicel .... i. salemensis Hayat, Alam & Agarwal
3. Fore wings hyaline 4
- Fore wings uniformly infuscated, less than four times longer than wide; postmarginal vein (fig. 17 N) as long as stigmal vein; club (fig. 17 M) distinctly shorter than first funicle segment .... ii. singularis Shafee
4. Ocelli in an equilateral triangle, basal ocellus twice its diameter from occipital margin; scape shorter than basal two funicle segments combined ....., 5

- Ocelli in an obtuse angled triangle, basal ocellus 1.33 from eye and less than twice its diameter from occipital margin; scape as long as basal two funicle segments combined .... iii. dactylopii Howard

5. Scape (fig. 17 E) four and a half times longer than wide, costal cell broad; marginal vein (fig. 17 F) distinctly shorter than postmarginal vein, postmarginal vein twice the length of stigmal vein .... iv. gunturiensis Shafee

- Scape (fig. 17 I) about four times longer than wide, costal cell narrow, marginal vein (fig. 17 J) longer than postmarginal vein about one and a half times longer than stigmal vein .... v. brevipedicelus Khan & Shafee

6. Club shorter than preceding two funicle segments combined, scape shorter than basal two funicle segments combined... 7

- Club as long as or longer than preceding two funicle segments combined; scape longer than basal two funicle segments combined 8

7. Scape (fig. 17 O) about five times as long as wide; pedicel almost twice as long as wide, about two-third of first funicle segment; axillae yellow; scutellum yellow; submarginal vein with 16 setae..... vi. nigrocoxalis Compere

- Scape (fig. 17 G) about seven times as long as wide; pedicel two and a half times as long as wide, less than half the length of first funicle segment; axillae dark brown; scutellum yellowish brown; submarginal vein with 18 setae .... vii. longicornis Khan & Shafee

8. First funicle segment three times as long as wide, club longer than preceding two funicle segments combined; marginal and postmarginal veins subequal in length, each longer than stigmal vein, axillae reddish brown 9
- First funicle segment (fig. 17 K) three and a half times as long as wide, club as long as preceding two funicle segments combined, marginal vein (fig. 17 L) longer than postmarginal and stigmal veins separately; axillae dark brown..... .....viii. aligarhensis Khan & Shafee

9. Scape (figs. 16 A; 17 A) five times as long as wide; pedicel nearly twice as long as wide; width of frontovertex twice the length of first funicle segment; scutellum with a central elongated brown patch; speculum interrupted behind by four rows of discal setae; middle tibial spur as long as basitarsus, apical rim of tibia and tarsal segment 1-4 with 6,7,4,5 & 2 pegs respectively .... ix. brevis Hayat, Alam & Agarwal
- Scape six times as long as wide, pedicel two and a half times as long as wide; width of frontovertex less than

Fig.16 A-F. Leptomastix brevis Hayat, Alam & Agarwal, ♀

A. Antenna

B. Pronotum

C. Part of fore wing venation

D. Apical terga of abdomen

E. Part of external genitalia

F. Subgenital plate

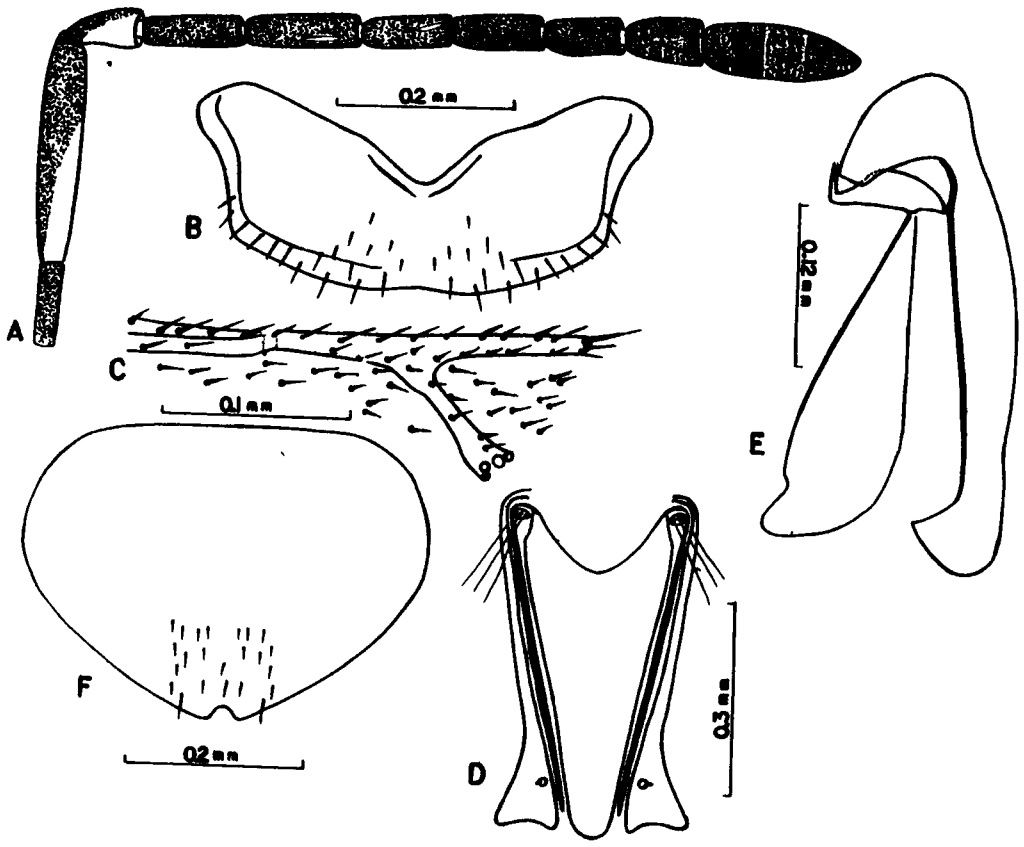


Fig. 16

twice the length of first funicle segment; scutellum without elongated brown patch; speculum interrupted behind by two rows of discal setae; middle tibial spur longer than basitarsus, apex of tibia and tarsal segments 1-4 with 9,14,6,5 & 4 pegs respectively ..... x. longiscapus Khan & Agarwal

i. Leptomastix salemensis Hayat, Alam & Agarwal

(Fig. 17 C-D)

Leptomastix salemensis Hayat, Alam & Agarwal, 1975:17.

Material examined: 1♀, INDIA: Andhra Pradesh, Kurnool Diguvameta, ex Coccid, 5.viii.1968, S. Adam Shafee.

Host: Coccids

Distribution: INDIA: Andhra Pradesh, Kerala, Tamil Nadu

ii. Leptomastix singularis Shafee

(Fig. 17 M-N)

Leptomastix singularis Shafee, 1971:50.

Material examined: ♀ holotype INDIA: Bihar, Ranchi, ex Mealy bug on Citrus sp., 31.x.1968, S. Adam Shafee.

Host: Mealy bug

Distribution: INDIA: Ranchi.

iii. Leptomastix dactylopii Howard

Leptomastix dactylopii Howard, 1885:42.

Host: Phenacoccus saccharifolii(Green)

Distribution: INDIA: Delhi.

iv. Leptomastix gunturiensis Shafee

(Fig. 17 E-F)

Leptomastix gunturiensis Shafee, 1971:49.

Material examined: ♀ holotype INDIA: Andhra Pradesh, Guntur, Budumpadu, ex Nipaecoccus vastator (Maskell) on Acacia arabica wild. 14.i.1968, S. Adam Shafee.

Host: Nipaecoccus vastator (Maskell)

Distribution: INDIA: Andhra Pradesh.

v. Leptomastix brevipedicelus Khan & Shafee

(Fig. 17 I-J)

Leptomastix brevipedicelus Khan & Shafee, 1975:194.

Material examined: ♀ holotype INDIA, Uttar Pradesh, Aligarh, Naqvi Park, ex Coccid, on Citrus sp., 15.xi. 1966.

Host: Coccid

Distribution: INDIA: Uttar Pradesh.

vi. Leptomastix nigrocoxalis Compere

(Fig. 17 O-P)

Leptomastix nigrocoxalis Compere, 1928:219.

Material examined: 9♀, INDIA: Mysore, ex Coccid on wild Plant, 29.vi.1966, S. Adam Shafee.

Hosts: Coccidohystrix insolitus (Green)

Icerya aegyptica (Douglas)

Nipaecoccus sp.

Nipaecoccus viridis (Newstead)

Phenacoccus sp.

Planococcus citri (Risso)

Distribution: Throughout the Indian subcontinent.

vii. Leptomastix longicornis Khan & Shafee

(Fig. 17 G-H)

Leptomastix longicornis Khan & Shafee, 1975:195.

Material examined: ♀ holotype INDIA: Mysore, Tumkur, ex Coccid, wild plant, 6.vii.1968, S. Adam Shafee.

Host: Coccid

Distribution: INDIA: Karnataka.

viii. Leptomastix aligarhensis Khan & Shafee

(Fig. 17 K-L)

Leptomastix aligarhensis Khan & Shafee, 1975:195.

Material examined: ♀ holotype INDIA: Uttar Pradesh, Aligarh, ex Coccid on Citrus sp. 20.xii.1974, M. Younus Khan.

Host: Coccid

Distribution: INDIA: Uttar Pradesh.

ix. Leptomastix brevis Hayat, Alam & Agarwal

(Fig. 16 A-F; 17 A,B)

Leptomastix brevis Hayat, Alam & Agarwal, 1975:14.

Material examined: 2♀, INDIA: Mysore, Chikmagalur, Bihar, ex Coccid on Acacia arabica, 1.iii. 1968, S. Adam Shafee.

Host: Icerya aegyptica (Douglas)

Distribution: INDIA: Kerala, Karnataka, Tamil Nadu.

x. Leptomastix longiscapus Khan & Agarwal

Leptomastix longiscapus Khan & Agarwal, 1976a:378.

Host: Coccid

Distribution: INDIA: Uttar Pradesh.

Fig.17 A-B. Leptomastix brevis Hayat, Alam & Agarwal, ♀

A. Antenna

B. Part of fore wing venation

Fig.17 C-D. Leptomastix salemensis Hayat, Alam & Agarwal, ♀

C. Antenna

D. Part of fore wing venation

Fig.17 E-F. Leptomastix gunturiensis Shafee, ♀

E. Antenna

F. Part of fore wing venation

Fig.17 G-H. Leptomastix longicornis Khan & Shafee, ♀

G. Antenna

H. Part of fore wing venation

Fig.17 I-J. Leptomastix brevipedicelus Khan & Shafee, ♀

I. Antenna

J. Part of fore wing venation

Fig.17 K-L. Leptomastix aligarhensis Khan & Shafee, ♀

K. Antennae

L. Part of fore wing venation

Fig.17 M-N. Leptomastix singularis Shafee, ♀

M. Antenna

N. Part of fore wing venation

Fig.17 O-P. Leptomastix nigrocoxalis Compere, ♀

O. Antenna

P. Part of fore wing venation

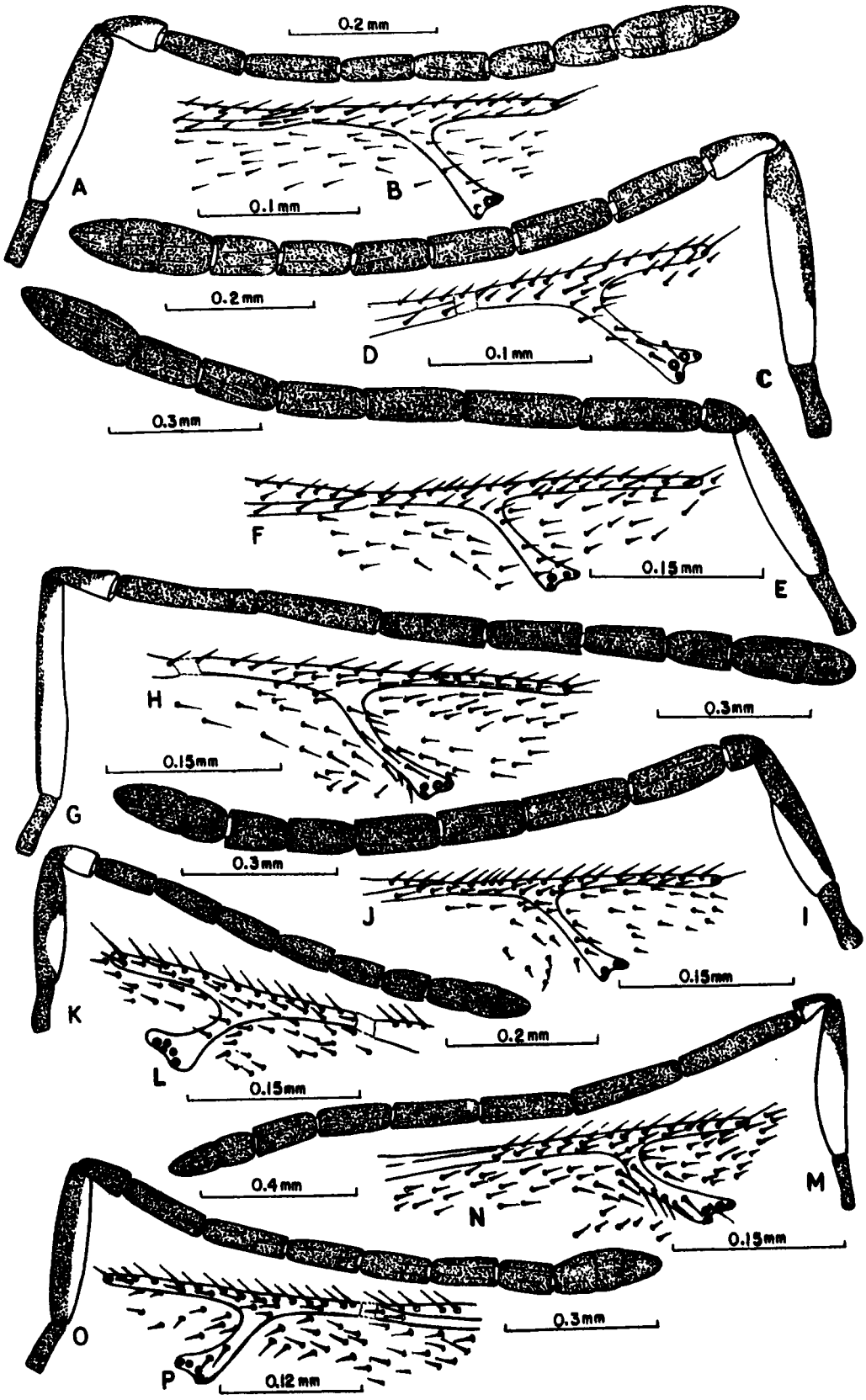

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Fig. 17

19. Genus Apoleptomastix Kerrich, 1982

Apoleptomastix Kerrich, 1982:416.

Type-species: Apoleptomastix spoliata Kerrich, by original designation.

Diagnosis: Body dark; head hypognathous; mandibles bidentate; maxillary palpi 4-segmented, labial palpi 3-segmented; antennae (fig. 18 A,G) normal, scape cylindrical, pedicel distinctly shorter than first funicle segment, funicle 6-segmented, segments longer than wide, club 3-segmented; pronotum with anterior margin concave, posterior margin almost straight; mesoscutum without parapsidal furrows; fore wings slightly infuscated, costal cell very narrow; marginal, postmarginal and stigmal veins (fig. 18 B,H) well developed; tenth tergum (fig. 18 C) enlarged and acuminate apically, paratergites long and narrow; subgenital plate (fig. 18 F) V-shaped with well developed antero-lateral apodemes; female genitalia with second valvifers (fig. 18 D) narrow medially, with a finger-like prolongation apically.

The genus is known to contain six species from India. Kerrich's (1982) key to species has been revised inorder to incorporate the Indian species.

Revised key to Indian species of Apoleptomastix Kerrich, based on females.

1. Marginal vein as long as or longer than stigmal vein 2
- Marginal vein shorter than stigmal vein 3
2. Abdomen dark; antennae (fig. 18 A) with radicle and scape dark, club longer than third funicle segment; hind legs dark except apical half of tibiae and tarsi yellowish brown .... i. ranchiensis (Shamim & Shafee) comb. n.
- Abdomen yellowish brown; antennae (fig. 18 G) with radicle and scape yellowish brown, club as long as third funicle segment; hind legs completely yellowish brown .... ii. longicorpus (Shamim & Shafee) comb.n.
3. Frontovertex moderately shining, with microsculpture very, not extremely, fine; mesoscutum not markedly shining, with piliferous punctures separated by about twice their own diameters, the hairs white, at least the pronotum and mesoscutum black; antennae having scape more evenly rounded bellow and sixth funicle segment twice or more the length of its greatest breadth, second funicle segment conspicuously dark in about apical sixth or more 4
- Frontovertex strongly shining, with microsculpture extremely fine, mesoscutum markedly shining, with piliferous punctures

separated by about three times their own diameters, the hairs rufous, thorax and propodeum rufous, with only slight infuscation, antennae having scape broadest before middle and sixth funicle segment, less than twice length of its greatest breadth, second funicle segment almost wholely white, with only slight darking at extreme apex .... iii. poonensis (Mani & Kaul)

4. Ocelli in an acute triangle; mesoscutum with reticulate microsculpture not extremely fine; propodeum without a defined median area, first antennal club segment separated by a normal suture, mesopleuron black, scutellum, axillae and propodeum above mainly black, legs having fore and mid coxae and mid trochanters black, and much infuscation beyond 5

\- Ocelli in about an equilateral triangle; mesoscutum with reticulate microsculpture weak and extremely fine, propodeum with a median area bounded by distinct costae, first antennal club segment well separated, mesopleura dull rufous, scutellu, axillae and propodeum above dull rufous; legs rufous, with no infuscation except on tarsal apices ...iv. rufipleuris Kerrich

5. Fore wings with stronger band of infuscation in basal fifth; mesoscutum beset with piliferous punctures separated by about twice their own diameters; antennal scape pale rufous, with infuscation above and often beneath, mesopstscutellum and broad hind margin of metanotum conspicuously dull rufous, gaster rufous, with apical infuscation extending forward, legs

mainly rufous ..... v. rufiscapus Kerrich

- Fore wings lightly infuscate throughout, mesoscutum beset with piliferous punctures separated by rather less or more than their own diameters, antennal scape brown, whitish in about apical fifth and with an elongate whitish mark; thorax glossy black with weak bronzy reflection, the margins at most narrowly dull brown, gaster black at base, merging to paler at apex; legs pale testaceous to stramineous .... vi. spoliata Kerrich.

i. Apoleptomastix ranchiensis (Shamim & Shafee) comb.n.

(Fig. 18 A-F)

Xiphomastix ranchiensis Shamim & Shafee, 1984:24.

Material examined: ♀ holotype INDIA: Bihar, Ranchi, Agricultural University Campus, ex Coccidohystrix insolitus (Green) 5.x.1982, S.M. Shamim.

Host: Coccidohystrix insolitus (Green)

Distribution: INDIA: Ranchi.

ii. Apoleptomastix longicorpus (Shamim & Shafee) comb.n.

(Fig. 18 G-H)

Xiphomastix longicorpus Shamim & Shafee, 1984:25.

Material examined: ♀ holotype INDIA: Bihar, Ranchi, Agricultural University Campus, ex Nipaecoccus vastator (Maskell), 5.x.1982, S.M. Shamim.

Host: Nipaecoccus vastator (Maskell)

Distribution: INDIA: Ranchi.

iii. Apoleptomastix poonensis (Mani & Kaul)

Pseudleptomastix poonensis Mani & Kaul, 1974:68.

Xiphomastix poonensis (Mani & Kaul); Hayat, 1979b:323.

Apoleptomastix poonensis (Mani & Kaul); Kerrich, 1982:420.

Host: Unknown

Distribution: INDIA: Poona, Delhi.

iv. Apoleptomastix rufipleuris Kerrich

Apoleptomastix rufipleuris Kerrich, 1982:421.

Host: Unknown

Distribution: INDIA: Bangalore.

v. Apoleptomastix rufiscapus Kerrich

Apoleptomastix rufiscapus Kerrich, 1982:422.

Host: Unknown

Distribution: INDIA: Delhi, Manjaler Dam, Bannerghatta.

vi. Apoleptomastix spoliata Kerrich

Apoleptomastix spoliata Kerrich, 1982:424.

Xiphomastix poonensis (Mani & Kaul); Hayat, 1979:324 (misdetermination)

Xiphomastix poonensis (Mani & Kaul); Prinsloo & Annecke, 1979:351 (misdetermination)

Host: Unknown

Distribution: Widely distributed in India.

Fig.18 A-F. Apoleptomastix ranchiensis (Shamim & Shafee) ♀, comb.n.

A. Antenna

B. Part of fore wing venation

C. Apical terga of abdomen

D. Second valvifer

E. First valvifer

F. Subgenital plate

Fig.18 G-H. Apoleptomastix longicorpus (Shamim & Shafee) ♀, comb.n.

G. Antenna

H. Part of fore wing venation

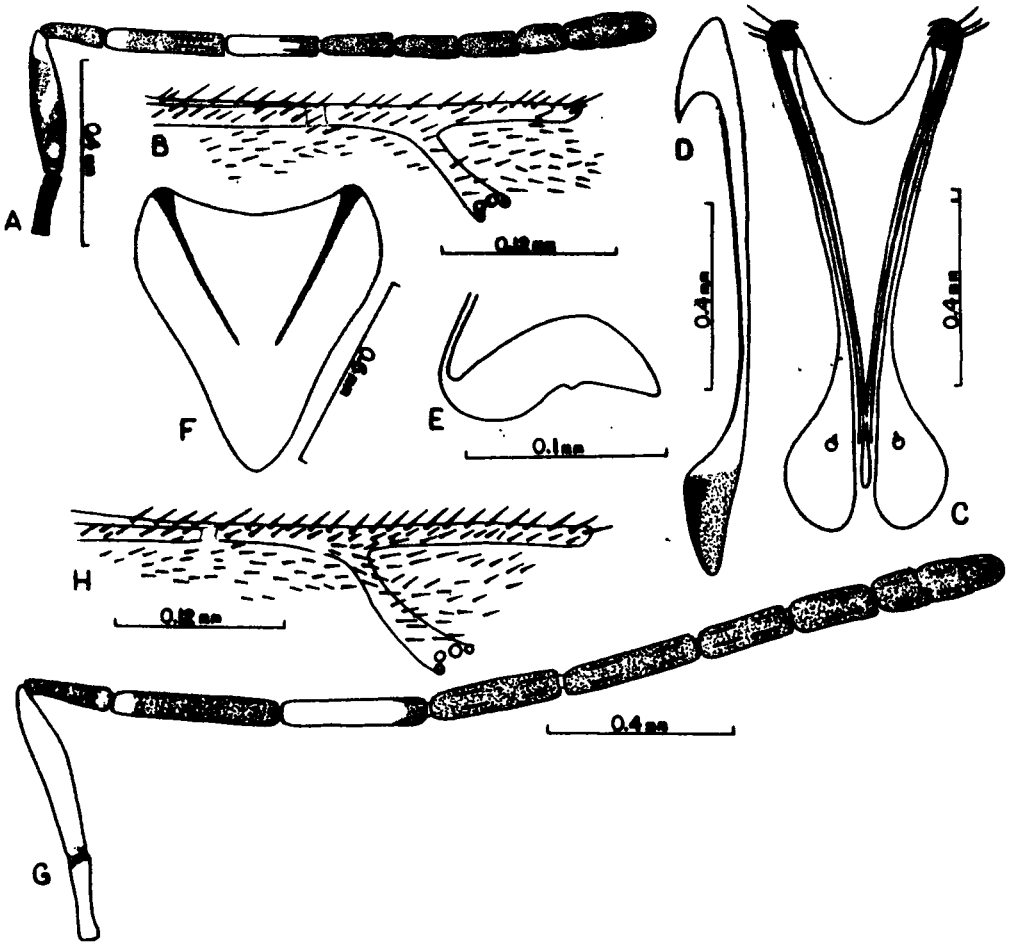

Fig. 18

20. Genus Neodusmetia Kerrich, 1964

Neodusmetia Kerrich, 1964a:76.

Type-species: Dusmetia sangwani Subba Rao, by original designation.

Diagnosis: Head smooth, hypognathous; mandibles (fig. 19 A) bidentate; maxillary palpi 4-segmented, labial palpi 3-segmented; antennae (fig. 19 B) with scape slightly dilated, pedicel longer than first funicle segment, funicle 6-segmented, segments wider than long, club 3-segmented; pronotum (fig. 19 C) of uniform width; anterior margin slightly concave, posterior margin straight; mesoscutum without parapsidal furrows; wings rudimentary in females, fully developed in males; tenth tergum (fig. 19 E) enlarged, paratergites long and narrow; subgenital plate (fig. 19 F) semicircular without antero-lateral apodemes; female genitalia (fig. 19 G) with second valvifers narrow medially with finger-like prolongation, apically basal three-fourth of outer plates with thickened dorsal margin, apex of distal one-fourth sickle-shaped.

The genus is known to contain single species from India.

1. Neodusmetia sangwani (Subba Rao)

(Fig. 19 A-G)

Dusmetia sangwani Subba Rao, 1957:385.

Dusmetia indica Burks, 1957:125.

Neodusmetia Sangwani (Subba Rao); Kerrich, 1964a:76.

Material examined: 4♀, INDIA: Mysore, Bellary, ex Antonina sp. on Cynodon sp., 13.vii.1968, S. Adam Shafee; 10♀, INDIA: Bihar, Ranchi, ex Antonina sp. on Cynodon sp.,3.ix.1986, S.M. Shamim.

Host: Antonina sp.

Antonina indica (Maskell)

Antonina graminis (Maskell)

Distribution: Throughout the Indian subcontinent.

Fig.19 A-G. Neodusmetia sangwani (Subba Rao), ♀

A. Mandible

B. Antenna

C. Pronotum

D. Part of middle leg

E. Apical terga of abdomen

F. Subgenital plate

G. Part of external genitalia

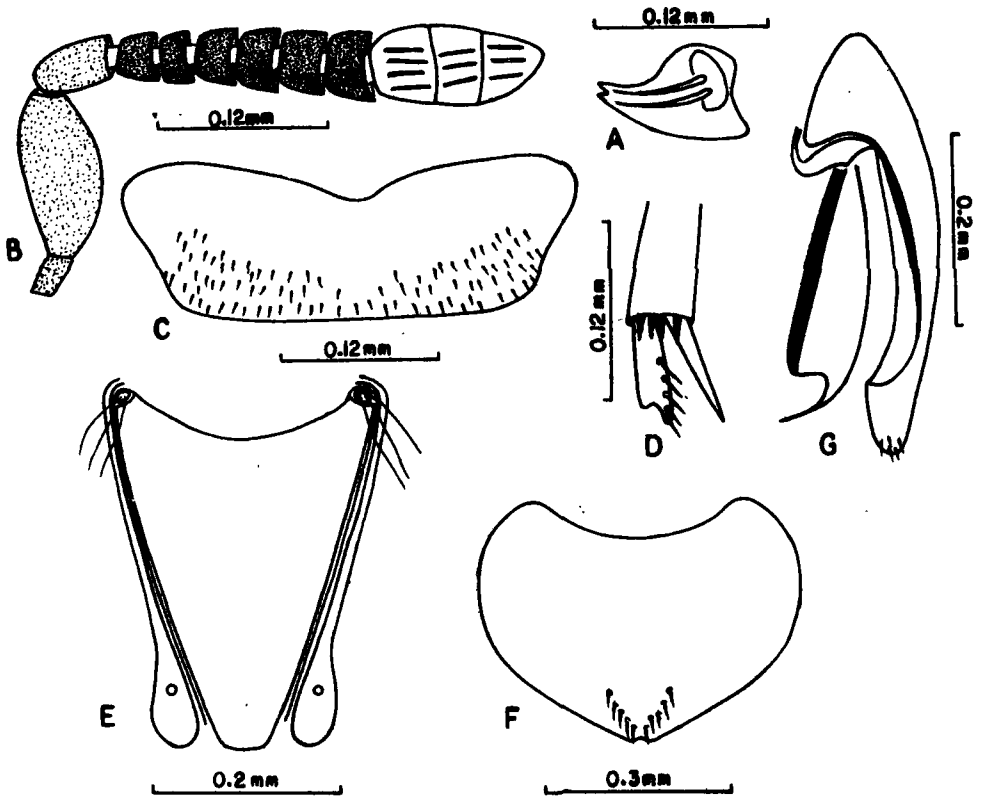

Fig. 19

21. Genus Anagyrus Howard, 1896

Anagyrus Howard, in Howard & Ashmead, 1896 : 638.

Type-species: Anagyrus greeni Howard, by monotypy.

Heterarthrellus Howard, 1898b:239.

Type-species: Heterarthrellus australiensis Howard, by monotypy.

Paranusia Brethes, 1913:102.

Type-species: Paranusia bifasciata Brethes, by monotypy.

Philoponectroma Brethes, 1913:104.

Type-species: Philoponectroma pectinatum Brethes, by monotypy and original designation.

Gyranusia Brethes, 1920:137.

Type-species: Gyranusia porteri Brethes, by monotypy.

Gyranusa Mercet, 1921:123.

Type-species: Gyranusa matritensis Mercet, by original designation.

Protanagyrus Blanchard, 1940:115.

Type-species: Protanagyrus aciculatus Blanchard, by monotypy.

Xiphomastix De Santis, 1972:45.

Type-species: Xiphomastix bellator De Santis, by original designation.

Cremesina Noyes & Hayat, 1984:260. Syn.n.

Type-species: Cremesina aquilonaris Noyes & Hayat, by original designation.

Diagnosis: Head usually hypognathous, rarely subprognathous; mandibles bidentate; maxillary palpi 4-segmented, labial palpi 3-segmented; antennae (figs. 21 A,C,E,G,I,K, 22 A,C,E,G,I,K) normal, differently coloured, scape dilated, pedicel as long as or longer or shorter than first funicle segment, funicle 6-segmented, segments longer than wide; club 3-segmented; pronotum (fig. 24 J) of uniform width, anterior margin concave, posterior margin convex with submarginal ridge; mesoscutum without parapsidal furrows; fore wings (figs. 20 B; 23 B,H; 24 B,K,) hyaline or slightly infuscated, costal cell moderately broad or narrow, marginal vein (figs. 21 B,D,F,H,J,L) longer than wide, postmarginal vein well developed or rudimentary, stigmal vein well developed; tenth tergum (figs. 20 D; 23 D; 24 D,M) enlarged, paratergites long and narrow; subgenital plate (figs. 20 E; 23 E; 24 E,N) semicircular with well developed antero-lateral apodemes; female genitalia (figs. 26 A-H; 27 A-F) with second valvifers narrow, with prolongation apically, outer plate always with a sickle-shaped prolongation apically.

Comments: Noyes and Hayat (1984) proposed Cremesina. A careful study of the type-species C. aquilonaris Noyes and Hayat (fig. 24 H-O) reveals that this species definitely belongs to Anagyrus Howard. The present author, therefore synonymised Cremesina Noyes and Hayat with Anagyrus Haward.

The genus is known to contain 27 species from India and a key for their separation is given below:

Fig.20 A-G. Anagyrus albiclavatus sp. n., ♀

A. Antenna

B. Fore wing

C. Part of fore wing venation

D. Apical terga of abdomen

E. Subgenital plate

F. Part of external genitalia

G. First valvifer

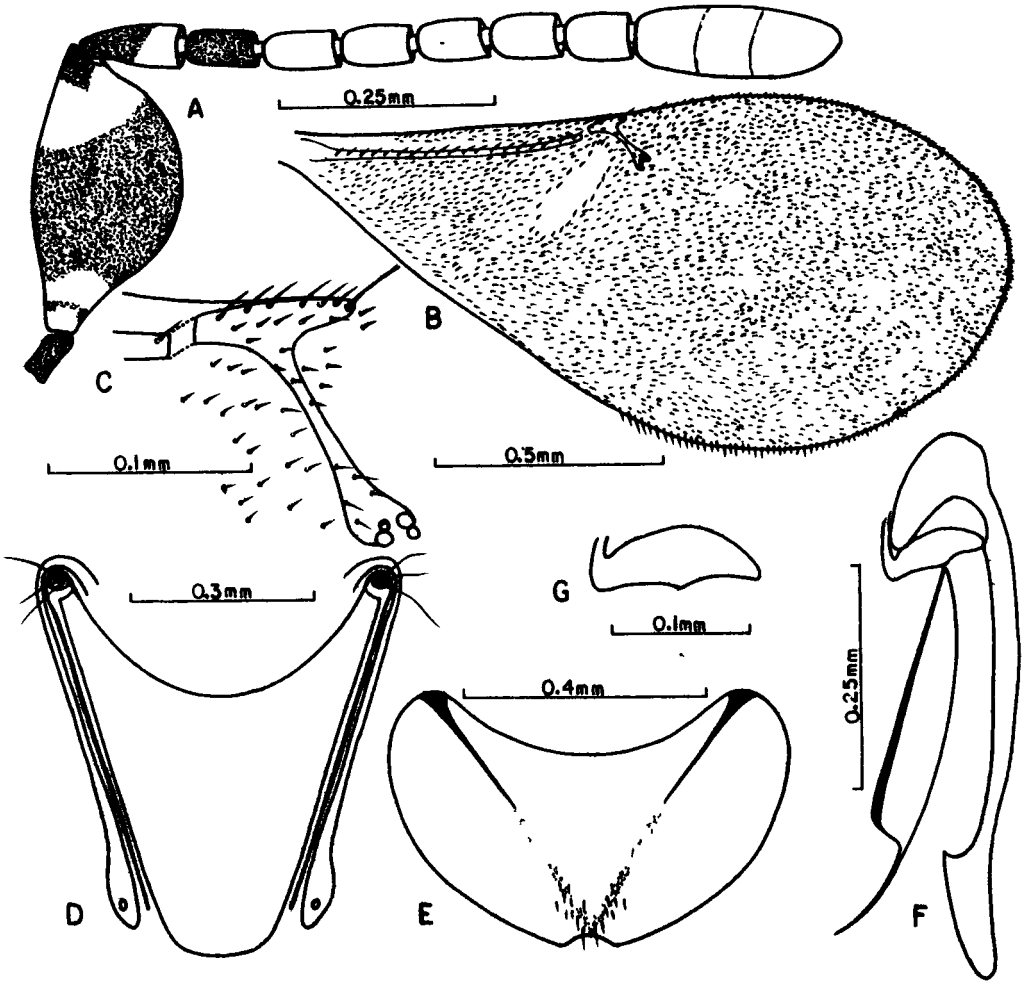

Fig. 20

Revised key to Indian species of Anagyrus Howard, based on females.

1. Body normal, never dorsoventrally flattened; head hypognathous 2
- Body dorsoventrally flattened; head sub-prognathous; fore wings with stigmal vein (fig. 25 B,D,F,H,J) not longer than marginal and post-marginal veins combined; abdomen long, at least as long as head and thorax combined; ovipositor long, arising from base of abdomen, second valvifers (fig. 27 B-F) long and narrow 21
2. Body usually orange yellow, rarely dark brown; fore wings (fig. 20 B) hyaline, disc with uniformly hyaline setae; antennae (fig. 20 A) with funicle segment sixth and club usually orange yellow 3
- Body usually reddish brown; fore wings (figs. 23 B;H; 24 B,K) with broad infuscated patch beneath venation, disc with coarse and hyaline setae; antennae (figs. 23 A,G; 24 A,I) with at least funicle segment sixth and club dark 18
3. Postmarginal vein distinctly shorter than stigmal vein 4
- Postmarginal vein (fig. 21 D) longer than stigmal vein; pedicel (fig. 21 C) distinctly longer than first funicle segment, funicle segments first and second about two times and third less than two times longer than wide; club about as long as preceding three funicle segments combined..... ..... i. gunturiensis Shafee, Alam & Agarwal.

4. Marginal vein shorter than postmarginal and stigmal veins combined 5

- Marginal vein (fig. 21 B) distinctly longer than postmarginal and stigmal veins combined; antennae (fig. 21 A) dark except a sub-apical white cross band on scape; pedicel about as long as first funicle segment, first funicle segment three times and sixth segment two times longer than wide ..... ii. longipennis Shafee, Alam & Agarwal

5. Pedicel distinctly longer than first funicle segment 6

- Pedicel not longer than first funicle segment 15

6. Frontovertex narrower than length of scape 7

- Frontovertex as wide or wider than length of scape; first funicle segment (fig. 21 E) shorter than following segment; fore wings with marginal and postmarginal veins (fig. 20 F) combined shorter than stigmal vein; body small .... iii. nigroradiclatus Subba Rao & Rai

7. Notum of thorax dominantly ferrugineous 8

- Notum of thorax deeply dark; scape (fig. 22 K) about twice as long as wide; first funicle segment basally infuscated, one and a half times longer than wide; stigmal vein (fig. 22 L) longer than marginal and postmarginal veins combined ..... iv. nigricorpus Shafee, Alam & Agarwal

8. First funicle segment usually black 9

- First two funicle segments (fig. 22 G) black, all funicle

segments subequal in length, first about twice and sixth one and a half times longer than wide, scape slightly more than twice as long as wide; marginal and postmarginal veins (fig. 22 H) combined slightly shorter than stigmal vein .... v. almoriensis Shafee, Alam & Agarwal

9. Marginal and postmarginal veins combined as long as or shorter than stigmal vein 10

- Marginal and postmarginal veins (fig. 22 J) combined longer than stigmal vein; scape (fig. 22 I) slightly more than two times longer than wide; first funicle segment about twice as long as wide, sixth funicle segment one and a half times longer than wide .....vi. sawadai Ishii

10. Postmarginal vein clearly shorter than one-half the length of marginal vein, marginal and postmarginal veins together much shorter than stigmal vein 11

- Postmarginal vein longer than one-half the length of marginal vein 12

11. Postmarginal vein (fig. 22 F) about one-third length of marginal vein; club (fig. 22E) much shorter than preceding three funicle segments together; scutellum with a midlongitudinal brown band extending upto basal half; mesopostphragma rounded at apex ..... vii. scutomaculatus Agarwal

- Postmarginal vein (fig. 21 L) nearly vestigeal, about one-seventh length of marginal vein; club (fig. 21 K) as long as

preceding three funicle segments together; mesopostphragma notched at the apex .....viii citri Agarwal

12. Fore wings with marginal and postmarginal veins together shorter than stigmal vein 13

- Fore wings with marginal and postmarginal veins together as long as stigmal vein..... ix. amoenus Compere

13. Pedicel shorter than first and second funicle segments combined, not all funicle segments subequal in length; fore wings with marginal and postmarginal viens combined distintly shorter than stigmal vein 14

- Pedicel as long as first and second funicle segments combined, funicle segments 1-6 subequal in length .... x. kivuensis Compere

14. Funicle segment first dark basally, one and half times as long as wide, shorter than second; club shorter than preceding three funicle segments together; fore wings with stigmal vein short..... xi. comperei Subba Rao & Rai

- Funicle segment first (fig. 20 A) completely dark, twice as long as wide, as long as second; club as long as preceding three funicle segments together; fore wings (fig. 20 B) with stigmal vein long..... xii. albiclavatus sp. n.

15. Pedicel as long as or slightly shorter than first funicle segment 16

- Pedicel one-half the length of first funicle segment; funicle

and club yellowish brown; marginal vein as long as postmarginal vein; stigmal vein longer than marginal and postmarginal veins combined ..... xiii. alami Hayat

16. Fore tibiae without fuscous cross bands 17

- Fore tibiae with two fuscous cross bands; first funicle segment (fig.22C) a little less than two and a half times longer than wide; scape more than twice longer than wide; club a little less than three times longer than wide; postmarginal vein (fig.22D) short, slightly over one-third length of the marginal vein; tibial spur of middle legs shorter than basitarsus, apical rim of tibiae with a row of 8 pegs ....;.....xiv. tibimaculatus Agarwal

17. Pedicel (fig. 21 I) as long as first funicle segment, first funicle segment twice as long as wide; club shorter than preceding three funicle segments combined; postmarginal vein (fig. 21 J) short, less than one-half the length of marginal vein; stigmal vein longer than marginal and postmarginal veins combined ..... xv. flavidus Shafee, Alam & Agarwal

- Pedicel (fig. 22 A) slightly shorter than first funicle segment, first funicle segment three times as long as wide; club as long as preceding three funicle segments combined; postmarginal vein (fig. 22 B) more than half the length of marginal vein; stigmal vein shorter than marginal and postmarginal veins combined .... xvi. indicus Shafee, Alam & Agarwal

18. Antennal scape more than twice as long as wide, pedicel longer than first funicle segment; fore wings naked basally ... .19

- Antennal scape (fig. 23 A) twice as long as wide, pedicel as long as first funicle segment, first funicle segment longest; fore wings (fig. 23 B) coarsely setose except apical transverse band with hyaline setae .... xvii. crassipennis sp. n.

19. Apex of fore wings and area anterior to venation coarsely setose; antennal scape less than two and a half times as long as wide 20

- Apex of fore wings (fig. 24 K) and area anterior to venation without coarse setae; antennal scape (fig. 24 I) slightly less than three times as long as wide .... xviii. aquilonaris (Noyes & Hayat) comb. n.

20. Funicle segments (fig. 23 G) fifth and sixth dark, club as long as preceding three funicle segments together .... xix. varicornis (Shamim & Shafee) comb. n.

- Funicle segment (fig. 24 A) sixth dark, club shorter than preceding three funicle segments together .... xx. nigriclavatus sp. n.

21. Ovipositor hidden or slightly exserted 22

- Ovipositor much exserted, exserted part two-fifth to one-half the length of abdomen; antennae (fig. 25 A) with pedicle

shorter than first funicle segment ... .
..... xxi. longiventris Hayat

22. Fore wings hyaline; scape not more than two and a half times as long as wide 23

- Fore wings faintly infuscated with a large dark patch below stigmal vein and a smaller triangular patch below distal half of submarginal vein; antennal scape (fig. 25 E) more than two and a half times as long as wide; labial palpi 2-segmented ..... xxii. shahidi Hayat

23. Antennae with at least one funicle segment white, pedicel as long as or longer than first funicle segment 24

- Antennae (fig. 25 G) with funicle uniformly dark, pedicel shorter than first funicle segment; fore wings with stigmal vein (fig. 25 H) about as long as marginal and postmarginal veins together ..... xxiii. ranchiensis Shamim & Shafee

24. Antennae with funicle segments 2-6 about twice as long as wide 25

- Antennae with funicle segments 2-6 slightly longer than wide .... xxiv. aligarhensis Agarwal

25. Antennal scape slightly more than two times as long as wide, funicle segments second or third or both white; fore wings with postmarginal vein rudimentary 26

- Antennal scape (fig. 25 I) three times as long as wide, first funicle segment brownish; fore wings with postmarginal vein (fig. 25 J) well developed, slightly shorter

than stigmal vein .....xxv. postmarginalis sp. n.

26. Antennae with funicle segment second (fig. 25 C) white, first funicle segment twice as long as wide, as long as sixth segment ..... xxvi. swezeyi Timberlake

\- Antennae with funicle segments second and third white; first funicle segment more than twice as long as wide, longer than sixth segment ..... xxvii. diversicornis Mercet

i. Anagyrus gunturiensis Shafee, Alam & Agarwal

(Fig. 21 C,D)

Anagyrus gunturiensis Shafee, Alam & Agarwal, 1975:15.

Host: Nipaecoccus vastator (Maskell)

N. viridis (Newstead)

Distribution: INDIA: Guntur.

ii. Anagyrus longipennis Shafee, Alam & Agarwal

(Fig. 21 A,B)

Anagyrus longipennis Shafee, Alam & Agarwal, 1975:16.

Material examined: Holotype ♀, INDIA: Kerala, Kottayam, ex Coccid, 6.v.1959, M. Hayat.

Host: Coccid

Nipaecoccus viridis (Newstead)

Distribution: INDIA: Kottayam.

Fig.21 A-B. Anagyrus longipennis Shafee, Alam & Agarwal, ♀

A. Antenna

B. Part of fore wing venation

Fig.21 C-D. Anagyrus gunturiensis Shafee, Alam & Agarwal, ♀

C. Antenna

D. Part of fore wing venation

Fig.21 E-F. Anagyrus nigroradiclatus Subba Rao & Rai, ♀

E. Antenna

F. Part of fore wing venation

Fig.21 G-H. Anagyrus sp., ♀

G. Antenna

H. Part of fore wing venation

Fig.21 I-J. Anagyrus flavidus Shafee, Alam & Agarwal ♀

I. Antenna

J. Part of fore wing venation

Fig.21 K-L. Anagyrus citri Agarwal, ♀

K. Antenna

L. Part of fore wing venation.

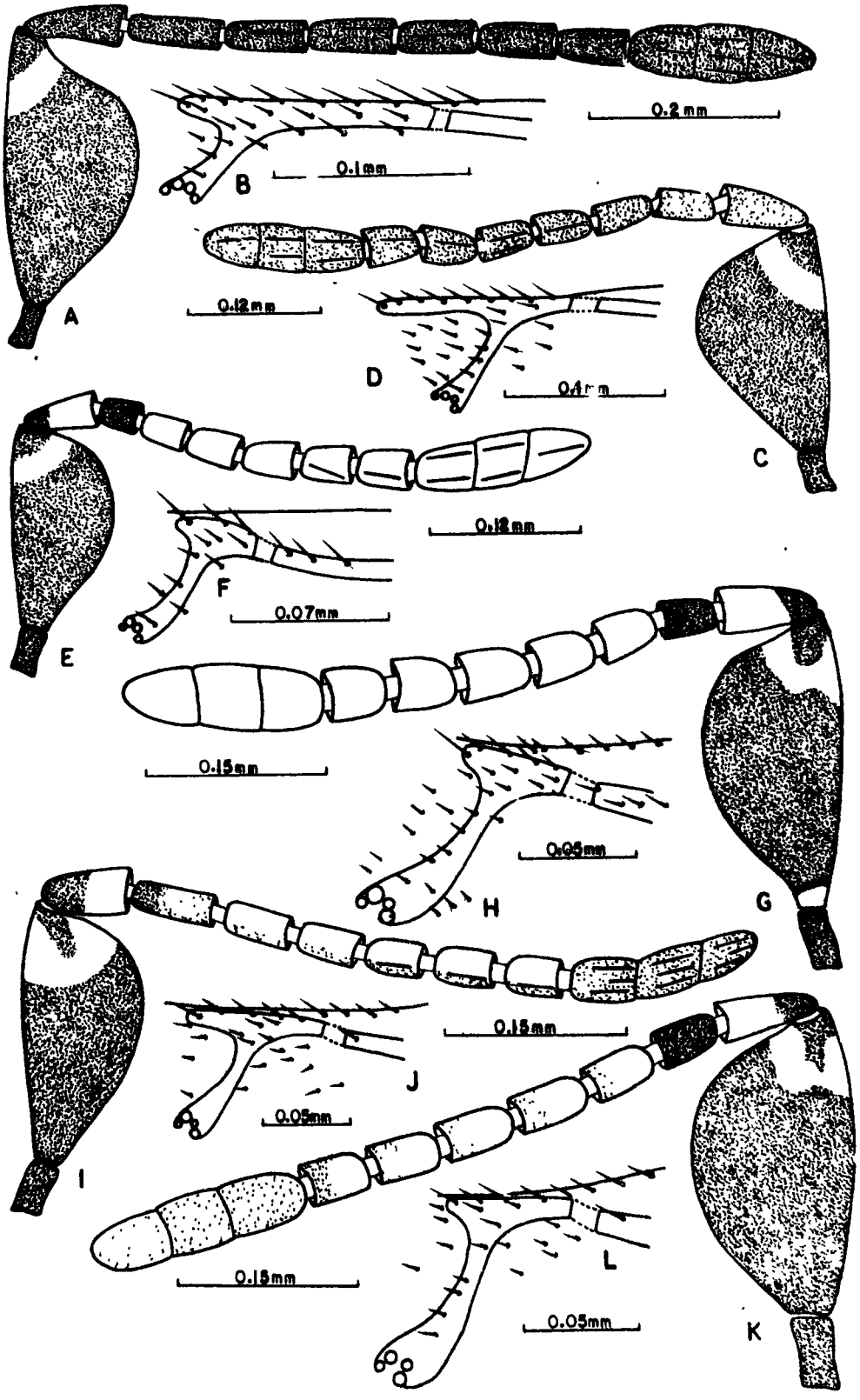
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Fig. 21

iii. Anagyrus nigroradiclatus Subba Rao & Rai
(Fig. 21 E-F)

Anagyrus nigroradiclatus Subba Rao & Rai, 1970:94.

Material examined; 2♀. INDIA: Himachal Pradesh, Joginder Nagar, ex Nipaecoccus vastator (Maskell) on Zyzyphus sp., 27.vi.1967, M. Hayat.

Host: Nipaecoccus vastator (Maskell)

Distribution: INDIA: Joginder Nagar.

iv. Anagyrus nigricorpus Shafee, Alam & Agarwal
(Figs. 22 K-L; 27 A,G)

Anagyrus nigricorpus Shafee, Alam & Agarwal, 1975:11.

Material examined: ♀ holotype INDIA: Mysore, Bangalore, Hebbal, ex Phenacoccus indicus (Avasthi & Shafee) on Prosopis spicegera Linn., 28.vi. 1968, S. Adam Shafee.

Host: Phenacoccus indicus (Avasthi & Shafee)

Distribution: INDIA: Bangalore.

v. Anagyrus almoriensis Shafee, Alam & Agarwal
(Figs. 22 G,H; 26 G,O)

Anagyrus almoriensis Shafee, Alam & Agarwal, 1975:13.

Material examined: ♀ holotype, INDIA: Uttar Pradesh, Almora, Hawal Bagh, ex Nipaecoccus vastator (Maskell), on wild plant, 25.vi.1967, S. Adam Shafee.

Host: Nipaecoccus vastator (Maskell)

Distribution: INDIA: Almora.

vi. Anagyrus sawadai Ishii
(Figs. 22 I,J; 26 H,P)

Anagyrus sawadai Ishii, 1928:88.
Anagyrus sawadai Ishii; Shafee, Alam & Agarwal, 1975:15.

Material examined: 2♀. INDIA: Uttar Pradesh, Aligarh, ex Rastrococcus iceryoides (Green) on Mangifera indica Linn., 2.i.1967, M. Hayat; 2 ♀. BIHAR, Ranchi, ex Rastrococcus iceryoides (Green) on Mangifera indica Linn., 20.xii.1986, S.M. Shamim.

Host: Rastrococcus iceryoides (Green)

Distribution: INDIA: Aligarh, Ranchi.

vii. Anagyrus scutomaculatus Agarwal
(Figs. 22 E,F; 26 D,L)

Anagyrus scutomaculatus Agarwal, 1965:49.

Fig.22 A-B. Anagyrus indicus Shafee, Alam & Agarwal, ♀

A. Antenna

B. Part of fore wing venation

Fig.22 C-D. Anagyrus tibimaculatus Agarwal, ♀

C. Antenna

D. Part of fore wing venation

Fig.22 E-F. Anagyrus scutomaculatus Agarwal, ♀

E. Antenna

F. Part of fore wing venation

Fig.22 G-H. Anagyrus almoriensis Shafee, Alam & Agarwal, ♀

G. Antenna

H. Part of fore wing venation

Fig.22 I-J. Anagyrus sawadai Ishii, ♀

I. Antenna

J. Part of fore wing venation

Fig.22 K-L. Anagyrus nigricorpus Shafee, Alam & Agarwal, ♀

K. Antenna

L. Part of fore wing venation

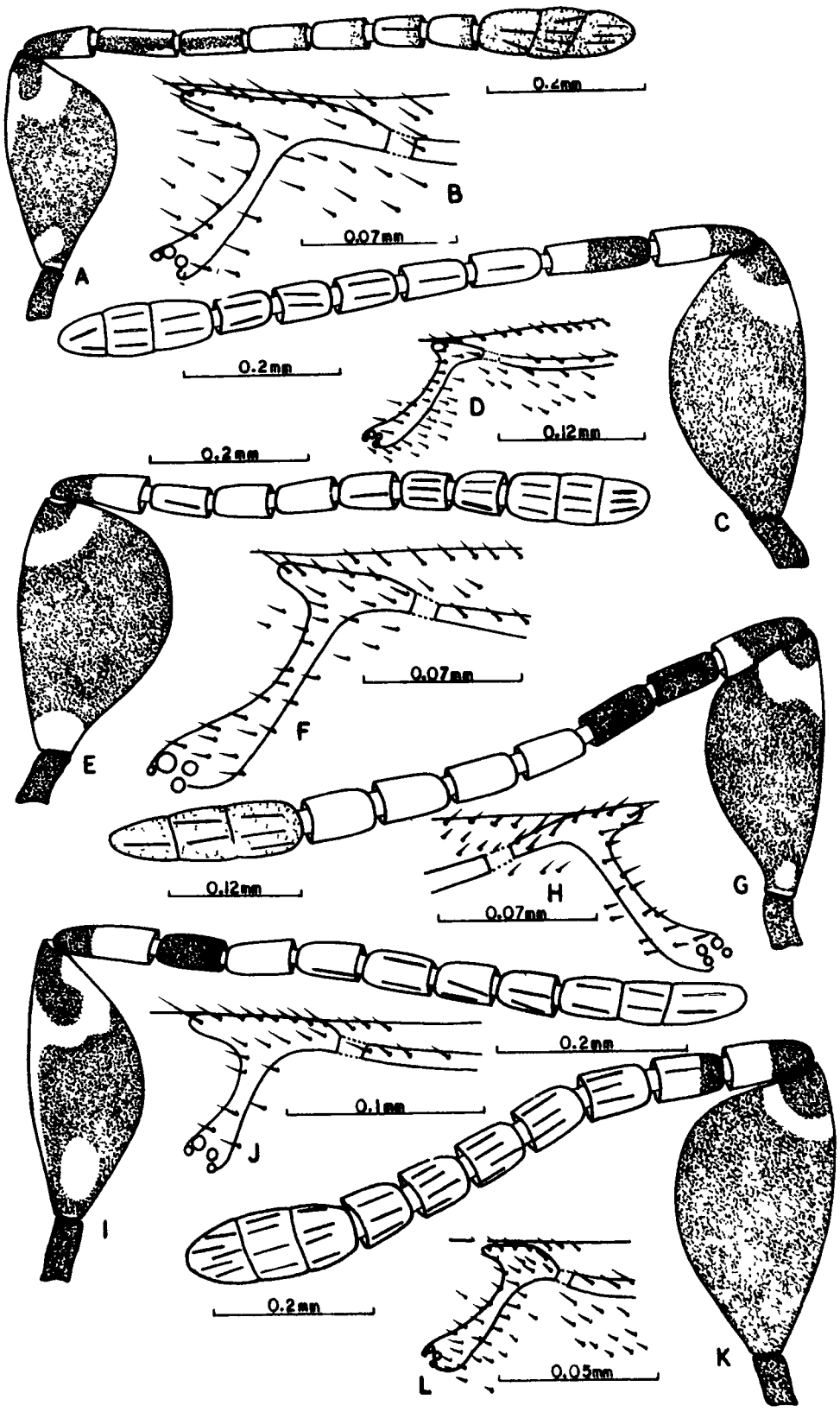
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Fig. 22

Material examined: 2 ♀. INDIA: Uttar Pradesh, Almora, ex. Nipaecoccus vastator (Maskell) on Ficus sp., 24.vi.1967, S. Adam Shafee.

Hosts: Coccidohystrix insolitus (Green)
Dysmicoccus williamsi Avasthi & Shafee
Nipaecoccus vastator (Maskell)
Nipaecoccus viridis (Newstead)
Planococcoides robustus Ezzat and McConnel
Rastrococcus cappariae Avasthi & Shafee

Distribution: INDIA: Aligarh, Kurnool, Motihari, Mysore, North Arcot.

viii. Anagyrus citri Agarwal
(Figs. 21 K,L; 26 B,J)

Anagyrus citri Agarwal, 1965:48.

Material examined: 2 ♀. INDIA: Uttar Pradesh, Aligarh, University Campus, ex Coccid on wild plant, 2.x.1986, S.M. Shamim.

Host: Planococcus citri (Risso)

Distribution: INDIA: Aligarh.

ix. Anagyrus amoenus Compere

Anagyrus amoenus Compere, 1939:12.

Host: Mealy bug

Distribution: INDIA: Delhi.

x. Anagyrus kivuensis Compere

Anagyrus kivuensis Compere, 1939:11.

Host: Ferrisia virgata (Cockerell)

Distribution: INDIA: Delhi.

xi. Anagyrus comperei Subba Rao & Rai

Anagyrus comperei Subba Rao & Rai, 1970:91.

Host: Ferrisia virgata (Cockerell)

Distribution: INDIA: Delhi.

xii. Anagyrus albiclavatus sp. n.

(Fig. 20 A-G)

Female

Head yellowish brown, wider than long in facial view; frontovertex distinctly wider than long; ocelli white, arranged in obtuse triangle, lateral ocellus separated by more than its own diameter from inner orbital and occipital margins separately; malar space shorter than eye width; antennae inserted at lower level of

eyes, interantennal space about one-half the width of frons between eyes at median ocellus. Antennae (fig. 20 A) white except radicle, major part of scape, basal half of pedicel and first funicle segment dark; scape slightly less than two times as long as wide, pedicel distinctly longer than first funicle segment; funicle segments 1-3 subequal in length, each twice as long as wide, segments 4-6 subequal in length each one and a half times as long as wide; club 3-segmented, three times as long as wide, as long as preceding three funicle segments together.

Thorax brownish except anterior margin of mesoscutum and metanotum dark. Fore wings (fig. 20 B) hyaline, slightly more than two times as long as wide, costal cell moderately broad; marginal vein (fig. 20 C) about twice as long as wide, about as long as postmarginal vein, together shorter than stigmal vein; marginal fringe short, spaced by a distance equal to half their length. Legs yellow except coxae of mid and hind legs brownish, mid tibial spur slightly shorter than basitarsus.

Abdomen brownish, slightly shorter than head and thorax combined; cercal plates situated near basal one-fifth of abdomen; tenth tergum (fig. 20 D) long, paratergites long and narrow; subgenital plate (fig. 20 E) semicircular with well developed antero-lateral apodemes; female genitalia (fig. 20 F) with second valvifers narrow, with long finger-like prolongation apically, outer plate with a

thickened dorsal margin and a sickle-shaped prolongation apically.

Body length: 1.4 mm.

1♀ paratype.

Holotype ♀, INDIA: Bihar, Hazaribagh, ex Nipaecoccus sp., 2.iv.1985, S.M. Shamim.

xiii. Anagyrus alami Hayat

Anagyrus alami Hayat, 1970a:112

Hosts: Nipaecoccus sp.

Pseudococcus sp.

Distribution: INDIA: Karnataka, Maharashtra.

xiv. Anagyrus tibimaculatus Agarwal

(Figs. 22 C,D; 26 C,K)

Anagyrus tibimaculatus Agarwal, 1965:50.

Material examined: 6 ♀. INDIA: Uttar Pradesh, Nainital, Haldwani, ex Planococcoides robustus Ezzat & McConnell on Mangifera indica Linn., 15.vi.1967, S. Adam Shafee.

Hosts: Planococcoides robustus Ezzat & McConnell

Planococcus citri (Risso)

Distribution: INDIA: Nainital.

xv. Anagyrus flavidus Shafee, Alam & Agarwal
(Figs. 21 I,J; 26 E,M)

Anagyrus flavidus Shafee, Alam & Agarwal, 1975:20.
Anagyrus flavidus Shafee, Alam & Agarwal, Noyes & Hayat, 1984:229.

Material examined: 10 ♀. INDIA: Uttar Pradesh, Aligarh, ex. Planococcoides robustus Ezzat & McConnell on Ficus sp., 10.ix.1966, S. Adam Shafee.

Hosts: Planococcoides robustus Ezzat & McConell
Pseudococcus sp.

Distribution: INDIA: Uttar Pradesh.

xvi. Anagyrus indicus Shafee, Alam & Agarwal
(Fig. 22 A,B; 26 A,I)

Anagyrus indicus Shafee, Alam & Agarwal, 1975:13.
Anagyrus agaraensis Saraswat, in Saraswat & Mukerjee, 1975:41. Syn.n.
Anagyrus inopus Noyes & Hayat, 1984:229. Syn.n.

Material examined: ♀ holotype INDIA: Kerala, Quilon, ex Mealy bug, on Hibiscus rosasinensis, 8.iii.1967, S. Adam Shafee.

Comments: Shafee et al. (1975) proposed indicus under Anagyrus Howard Noyes & Hayat (1984) shifted Leptomastidea indica

Subba Rao to Anagyrus and gave new name Anagyrus inopus to indicus Shafee et al. The present author made a detailed study of Leptomastidea indica Subba Rao and shifted it to Anagyrietta Ferriere. Anagyrus indicus Shafee et al. is revalidated and inopus Noyes and Hayat is treated as its synonym.

Hosts: Mealy bug

Nipaecoccus vastator (Maskell)

Nipaecoccus viridis (Newstead)

Coccidohystrix sp.

Ferrisia virgata (Cockerell)

Rastrococcus iceryoides (Green)

Distribution: Widely distributed in India.

xvii. Anagyrus crassipennis sp.n.

(Fig. 23 A-F)

Female

Head reddish brown frontovertex wider than long; ocelli white, arranged slightly in obtuse triangle, lateral ocellus separated by its own diameter from inner orbital and occipital margins separately; eyes silvery white; malar space shorter than eye width; antennae inserted below ocular line, inter-antennal space slightly less than width of frons between eyes at median ocellus.

Antennae (fig. 23 A) dark except a longitudinal band on scape, apical two-third of pedicel, funicle segments 2-4 white, funicle segment fifth slightly infuscated; scape flattened, slightly more than two times as long as wide; pedicel as long as first funicle segment, funicle segments longer than wide; club 3-segmented, slightly more than three times as long as wide, shorter than preceding three funicle segments together.

Thorax reddish brown except dorsum infuscated; mesoscutum without parapsidal furrows. Fore wings (fig. 23 B) with disc coarsely setose except a transverse band beyond venation with hyaline setae; costal cell narrow; marginal vein (fig. 23 C) as long as stigmal vein; postmarginal vein rudimentary; marginal fringe short.

Abdomen reddish brown, longer than thorax; cercal plates located on basal one-third of abdomen; tenth tergum (fig. 23 D) long, paratergites long and narrow; subgenital plate (fig. 23 E) semicircular with well developed antero-lateral apodemes; female genitalia (fig. 23 F) with second valvifers narrow, with a prolongation apically, outer plate with a sickle-shaped prolongation apically.

Body length: 1.6 mm

Holotype ♀. INDIA: Bihar, Jamshedpur, by sweeping vegetation, 6.ix.1984, S.M. Shamim.

xviii. Anagyrus aquilonaris (Noyes & Hayat) comb.n.

(Fig. 24 H-O)

Cremesina aquilonaris Noyes & Hayat, 1984:261.

Material examined: ♀ Paratype labelled; INDIA: Uttar Pradesh, Aligarh, 2.iv.1979, swept over grasses, M. Verma.

Host: Unknown

Distribution: INDIA: Aligarh, Delhi.

xix. Anagyrus varicornis (Shamim & Shafee) comb.n.

(Fig. 23 G-I)

Leptanusia varicornis Shamim & Shafee, 1985b:309.

Material examined: ♀ holotype labelled: India, Bihar, Patna, Danapur, 10.1.1984, S.M. Shamim.

Host: Unknown

Distribution: INDIA: Patna.

xx. Anagyrus nigriclavatus sp.n.

(Fig. 24 A-G)

Female

Head reddish brown; frontovertex wider than long; ocelli

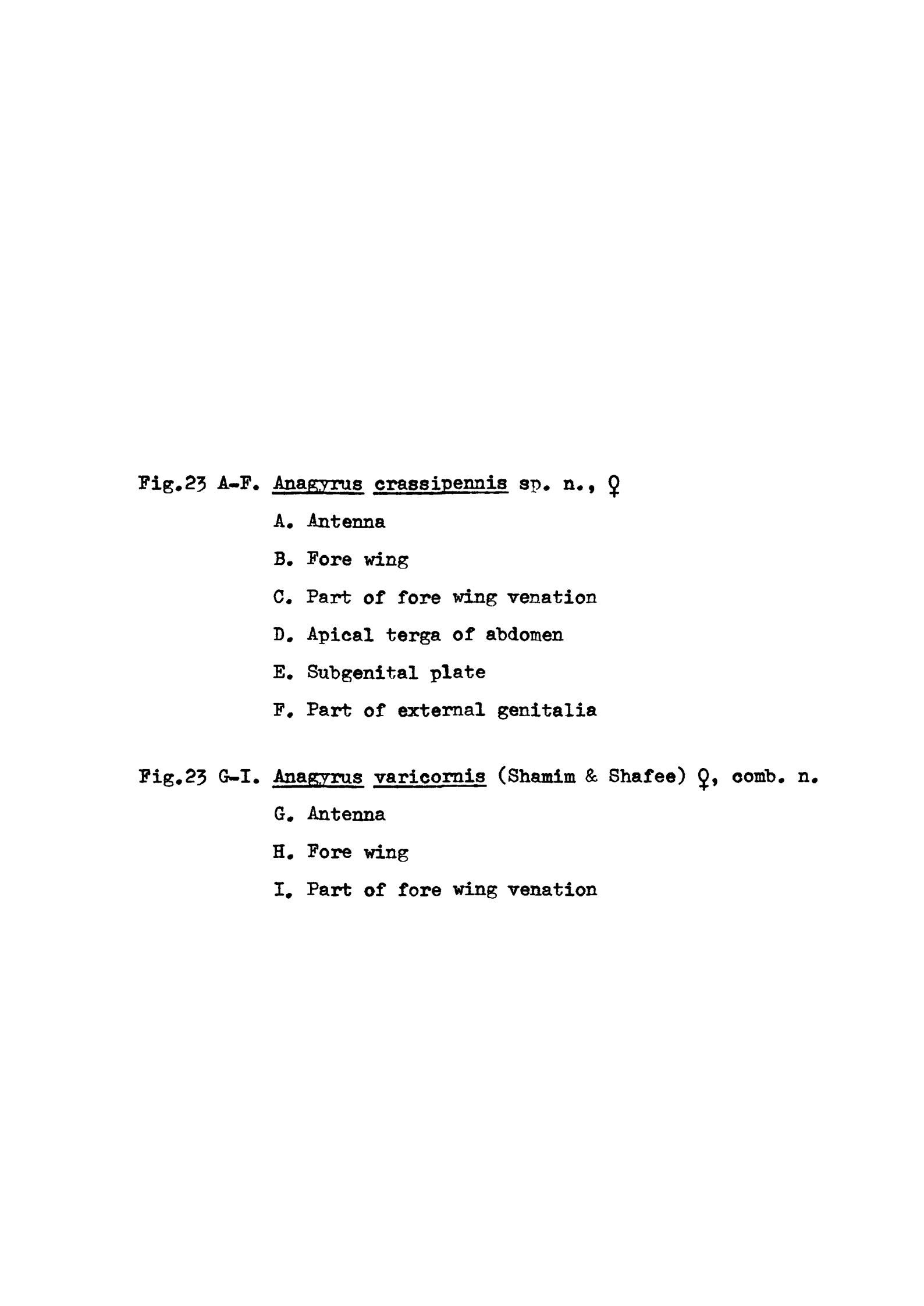

Fig.23 A-F. Anagyrus crassipennis sp. n., ♀

A. Antenna

B. Fore wing

C. Part of fore wing venation

D. Apical terga of abdomen

E. Subgenital plate

F. Part of external genitalia

Fig.23 G-I. Anagyrus varicornis (Shamim & Shafee) ♀, comb. n.

G. Antenna

H. Fore wing

I. Part of fore wing venation

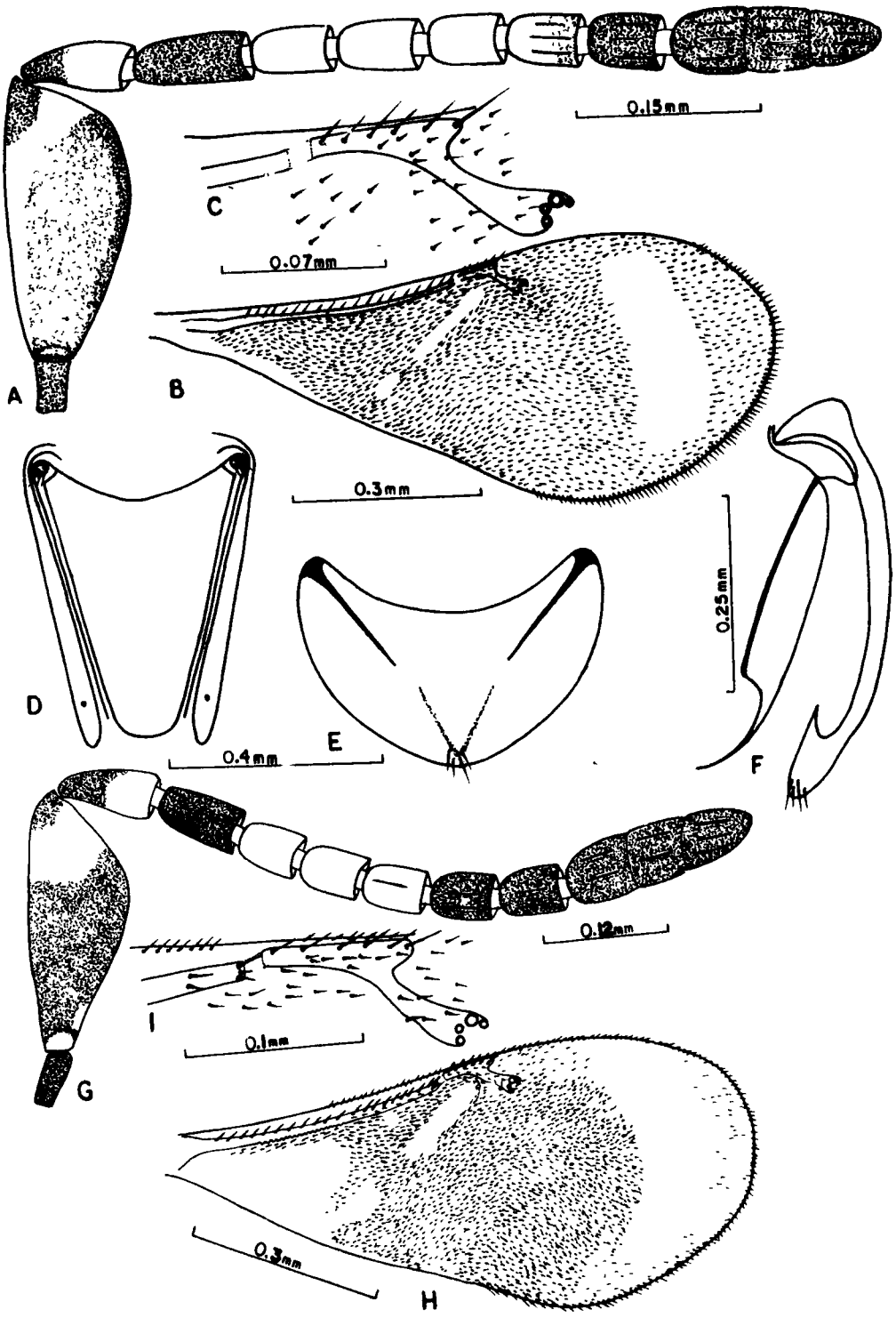

Fig. 23

red, arranged in slightly obtuse triangle, lateral ocellus separated by more than its own diameter from inner orbital and occipital margins separately; malar space shorter than eye width; antennae inserted at lower level of eyes, inter-antennal space about one-third the width of frons between eyes at median ocellus. Antennae (fig. 24 A) dark brown except base and apex of scape, apical half of pedicel and funicle segments 2-5 white; scape less than two and a half times as long as wide, pedicel slightly longer than first funicle segment, funicle segment first longest, 2-6 subequal in length, each one a half times as long as wide; club 3-segmented, three and a half times as long as wide, as long as preceding three funicle segments together.

Thorax reddish brown except pronotum, anterior margin of mesoscutum and metanotum dark brown. Fore wings (fig. 24 B) with coarse and hyaline setae, two and a half times as long as wide; costal cell narrow; marginal vein (fig. 24 C) longer than stigmal vein, postmarginal vein short, one-fourth the length of marginal vein; marginal fringe short, spaced by a distance equal to one-third their length. Legs yellowish brown except coxae, lateral margin of femora and tarsi of mid and hind legs dark; mid tibial spur as long as basitarsus.

Abdomen orange, longer than head and thorax combined; cercal plates situated near basal one-fourth of abdomen; tenth tergum (fig. 24 D) long, paratergites long and narrow; subgenital (fig. 24 E) semicircular with well developed antero-lateral apodemes;

female genitalia (fig. 24 F) with second valvifers narrow, outer plate with a sickle-shaped prolongation apically.

Body length: 1.4 mm

Holotype ♀. INDIA: Bihar, Ranchi, Namkum, by sweeping the vegetation, 12.x.1984, S.M. Shamim.

xxi. Anagyrus longiventris Hayat
(Figs. 25 A,B; 27 F,L)

Anagyrus longiventris Hayat, 1979a:173.

Material examined: 2 ♀. INDIA: Bihar, Jamshedpur, swept over grasses, 4.iv.1982, S.M. Shamim.

Host: Unknown

Distribution: INDIA: Uttar Pradesh, Himachal Pradesh, Bihar.

xxii. Anagyrus shahidi Hayat
(Fig. 25 E,F; 27 D,J)

Anagyrus shahidi Hayat, 1979 a:177

Material examined: 2 ♀. INDIA: Bihar, Ranchi, Birsa Agriculture University Campus, Kanke, 2.ix.1982, swept over grasses, S.M. Shamim.

Fig.24 A-G. Anagyrus nigriclavatus sp. n. ♀

A. Antenna

B. Fore wing

C. Part of fore wing venation

D. Apical terga of abdomen

E. Subgenital plate

F. Part of external genitalia

G. First valvifer

Fig.24 H-O. Anagyrus aquilonaris (Noyes & Hayat) ♀, comb. n.

H. Mandible

I. Antenna

J. Pronotum

K. Fore wing

L. Part of fore wing venation

M. Apical terga of abdomen

N. Subgenital plate

O. Part of external genitalia.

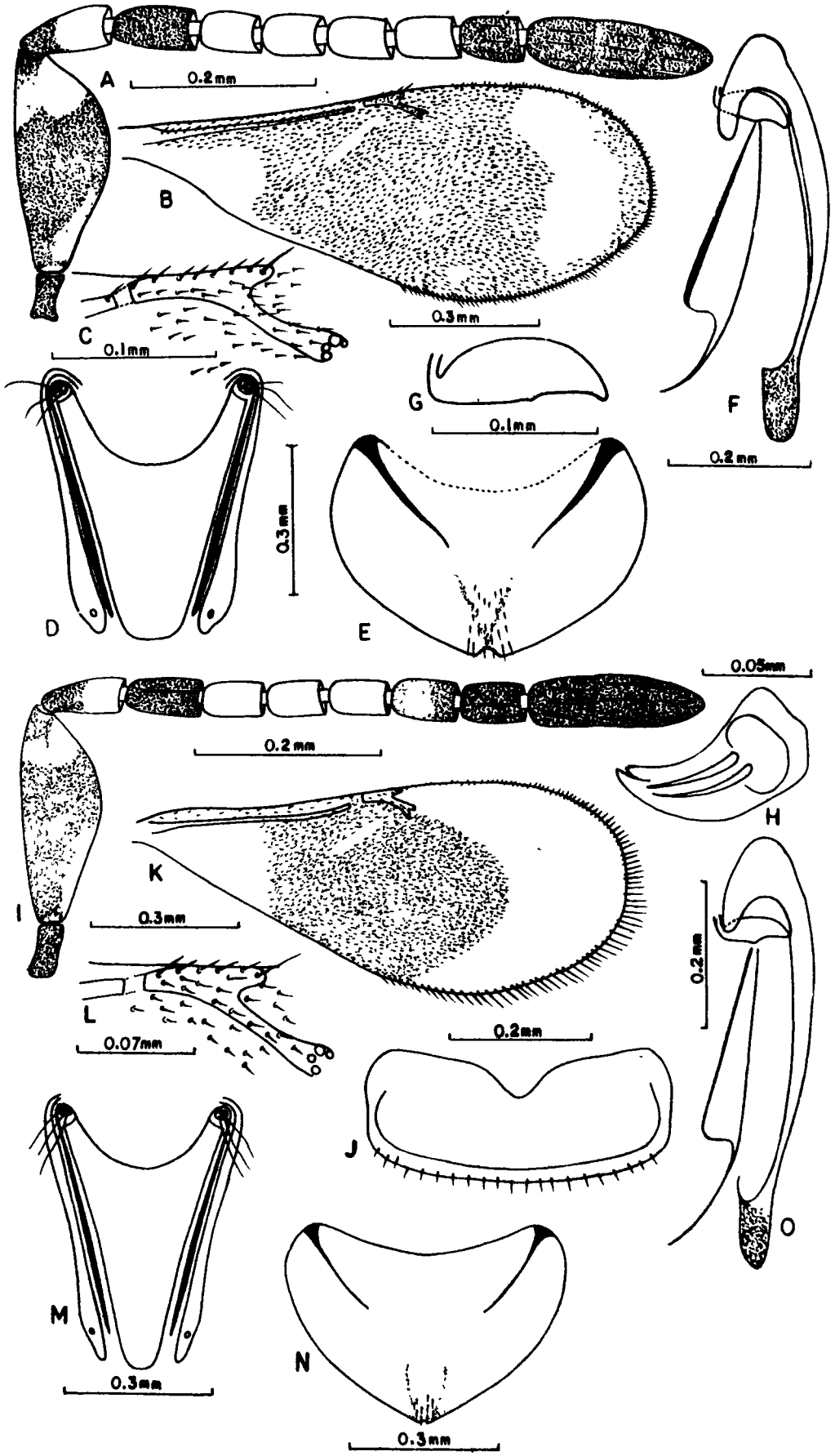
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Fig. 24

Host: Unknown

Distribution: INDIA: Andhra Pradesh,Rajasthan, Uttar Pradesh, Bihar.

xxiii. Anagyrus ranchiensis Shamim & Shafee
(Figs. 25 G,H; 27 B,I)

Anagyrus ranchiensis Shamim & Shafee, 1984:24.

Material examined: ♀ holotype . INDIA: Bihar, Ranchi, Agriculture University Campus, ex Coccidohystrix insolitus (Green) 5.x.1982, S.M. Shamim.

Host: Coccidohystrix insolitus (Green)

Distribution: INDIA: Ranchi.

xxiv. Anagyrus aligarhensis Agarwal

Anagyrus aligarhensis Agarwal, 1965:52.

Host: Saccharicoccus sacchari (Cockerell)

Distribution: INDIA: Uttar Pradesh, Aligarh.

xxv. Anagyrus postmarginalis sp. n.
(Figs. 25 I,J; 27 C,H)

Female

Head yellowish brown; frontovertex distinctly wider than

long; ocelli red, arranged slightly in obtuse triangle, lateral ocellus separated by slightly more than its own diameter from inner orbital and occipital margins separately; malar space shorter than eye width; antennae inserted at lower level of eyes, interantennal space about one-third the width of frons between eyes at median ocellus. Antennae (fig. 25 I) dark brown except base and apex of scape, apical half of pedicel yellow; scape three times as long as wide; pedicel distinctly longer than first funicle segment; funicle segments 1-5 almost subequal in length, each two times as long as wide, sixth shortest, one and a half times as long as wide; club 3-segmented, less than three and a half times as long as wide, longer than preceding two funicle segments together.

Thorax brownish, except pronotum, anterior margin of mesoscutum dark, metanotum dark brown. Fore wings hyaline, three times as long as wide, costal cell well developed; marginal vein (fig. 25 J) longer than stigmal and postmarginal veins separately; marginal fringe short, spaced by a distance equal to one-third their length. Legs orange yellow except lateral margin of femora and tarsi of fore legs dark, mid tibial spur shorter than basitarsus.

Abdomen brownish, distinctly longer than head and thorax together; cercal plates situated near basal one-fourth of abdomen; tenth tergum long, acuminate apically, paratergites long and narrow; subgenital plate with well developed antero-lateral apodemes; female

Fig.25 A-B. Anagyrus longiventris Hayat, ♀

A. Antenna

B. Part of fore wing venation

Fig.25 C-D. Anagyrus swezeyi Timberlake, ♀

C. Antenna

D. Part of fore wing venation

Fig.25 E-F. Anagyrus shahidi Hayat, ♀

E. Antenna

F. Part of fore wing venation

Fig.25 G-H. Anagyrus ranchiensis Shamim & Shafee, ♀

G. Antenna

H. Part of fore wing venation

Fig.25 I-J. Anagyrus postmarginalis sp. n., ♀

I. Antenna

J. Part of fore wing venation

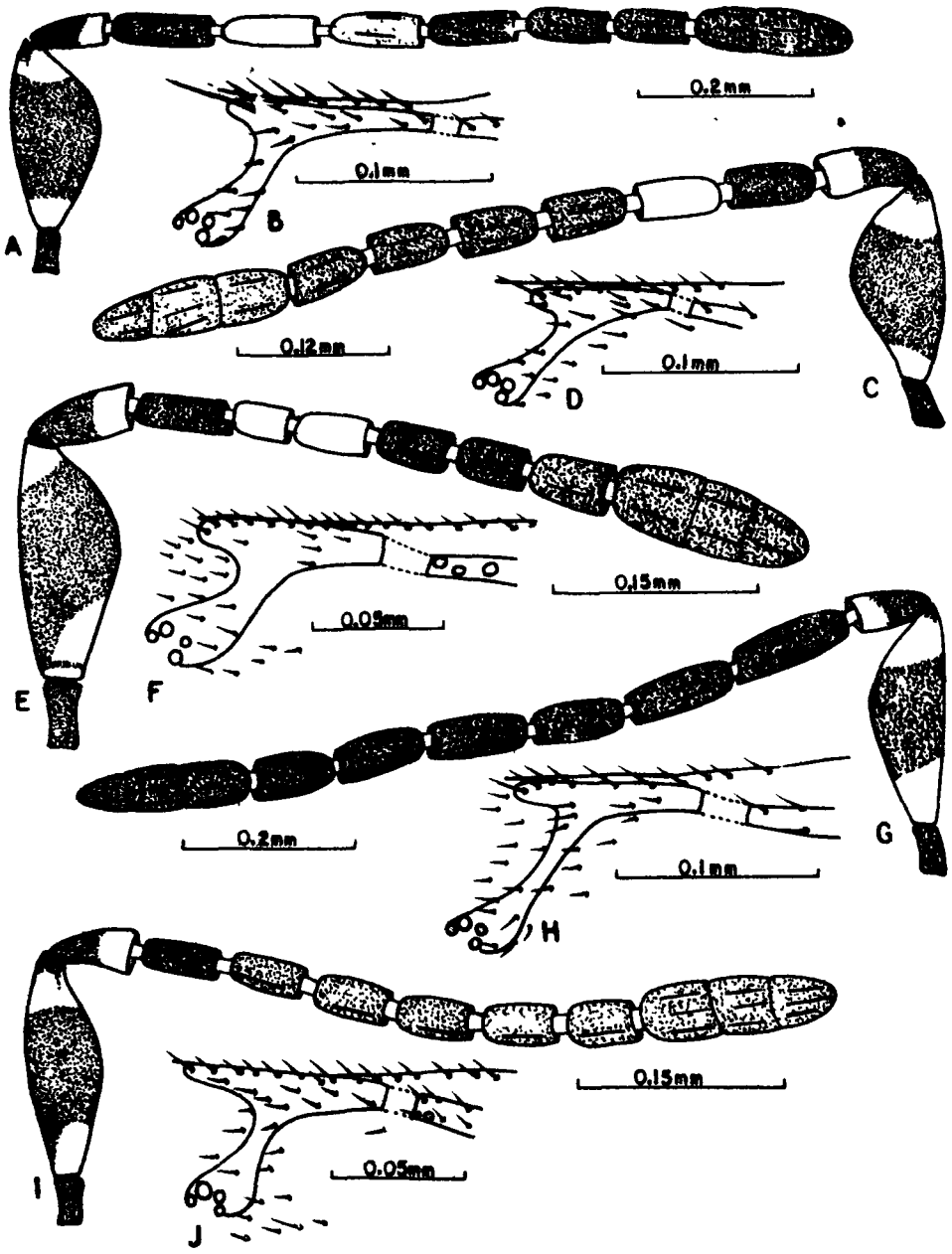
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Fig. 25

genitalia (fig. 27 C) with second valvifers narrow, with a long finger-like prolongation apically, outer plate with a thickened dorsal margin and a sickle-shaped prolongation apically.

Body length: 1.2 mm

Holotype ♀. INDIA: Bihar, Ranchi, Hehal, ex Nipaecoccus vastator (Maskell) on Ficus sp., 10.x.1984, S.M. Shamim.

Comments: The new species is closely related to swezeyi Timberlake but differs from it by its having antennal scape three times as long as wide, fore wings with postmarginal vein well developed.

xxvi. Anagyrus swezeyi Timberlake
(Figs. 25 C,D; 27 E,K)

Anagyrus swezeyi Timberlake, 1919b: 199.
Anagyrus punctulatus Agarwal, 1965:50 Syn. n.

Material examined: 2 ♀. INDIA: Bihar, Ranchi, swept over vegetation, 10.vi.1983, S.M. Shamim.

Hosts: Saccharicoccus sacchari (Cockerell)

Distribution: INDIA: Uttar Pradesh, Aligarh, Bihar, Ranchi.

Fig.26 A-H. Part of female external genitalia

A. Anagyrus indicus Shafee, Alam & Agarwal

B. Anagyrus citri Agarwal

C. Anagyrus tibimaculatus Agarwal

D. Anagyrus scutomaculatus Agarwal

E. Anagyrus flavidus Shafee, Alam & Agarwal

F. Anagyrus sp.

G. Anagyrus almoriensis Shafee

H. Anagyrus sawadai Ishii

Fig.26 I-P. First valvifer

I. Anagyrus indicus Shafee, Alam & Agarwal

J. Anagyrus citri Agarwal

K. Anagyrus tibimaculatus Agarwal

L. Anagyrus scutomaculatus Agarwal

M. Anagyrus flavidus Shafee, Alam & Agarwal

N. Anagyrus sp.

O. Anagyrus almoriensis Shafee Alam & Agarwal

P. Anagyrus sawadai Ishii

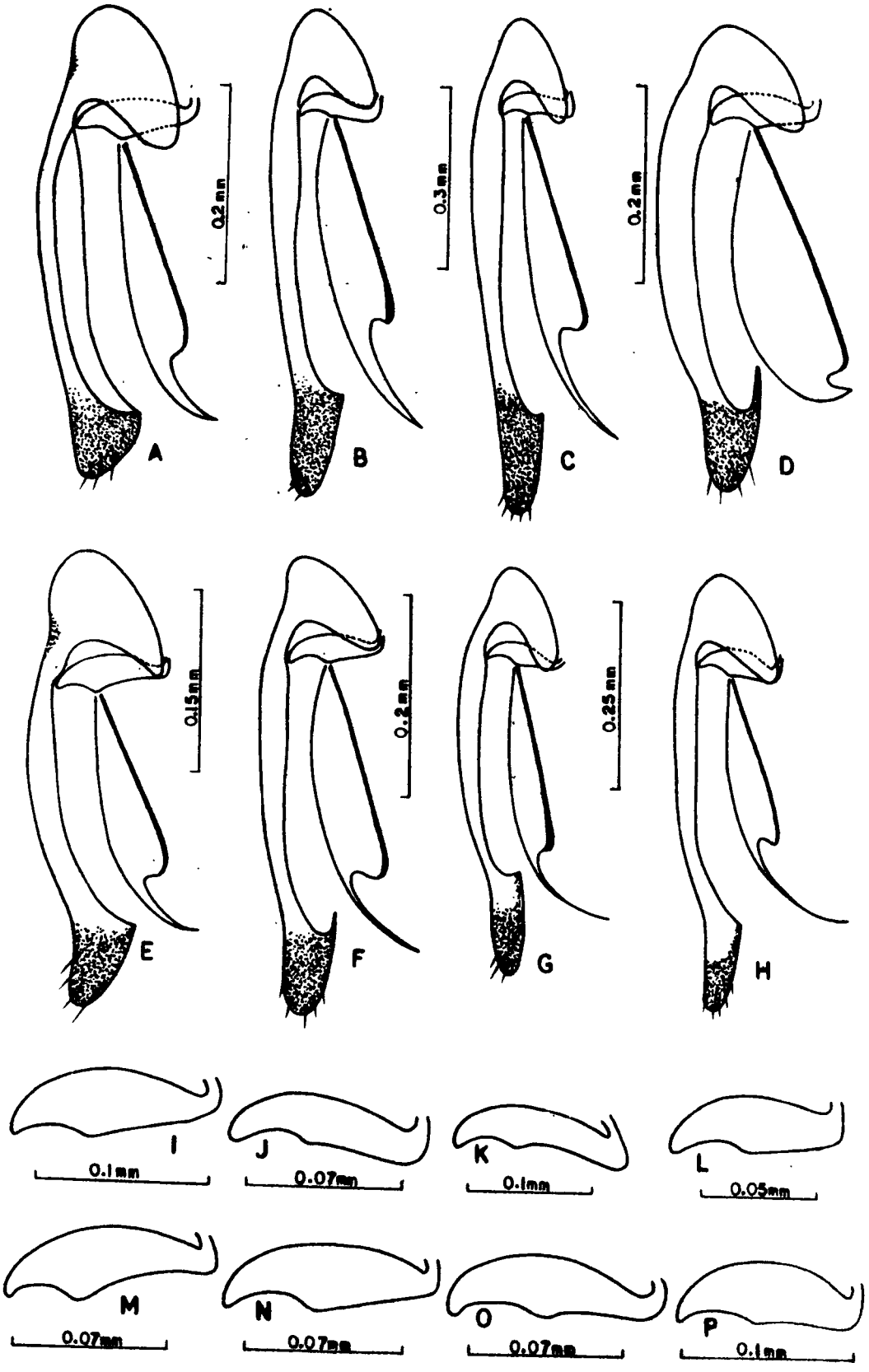
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Fig. 26

Fig.27 A-F. Part of female external genitalia

A. Anagyrus nigricorpus Shafee, Alam & Agarwal

B. Anagyrus ranchiensis Shamim & Shafee

C. Anagyrus postmarginalis sp. n.

D. Anagyrus shahidi Hayat

E. Anagyrus swezeyi Timberlake

F. Anagyrus longiventris Hayat

Fig.27 G-L. First valvifer

G. Anagyrus nigricorpus Shafee, Alam & Agarwal

H. Anagyrus postmarginalis sp. n.

I. Anagyrus ranchiensis Shamim & Shafee

J. Anagyrus shahidi Hayat

K. Anagyrus swezeyi Timberlake

L. Anagyrus longiventris Hayat

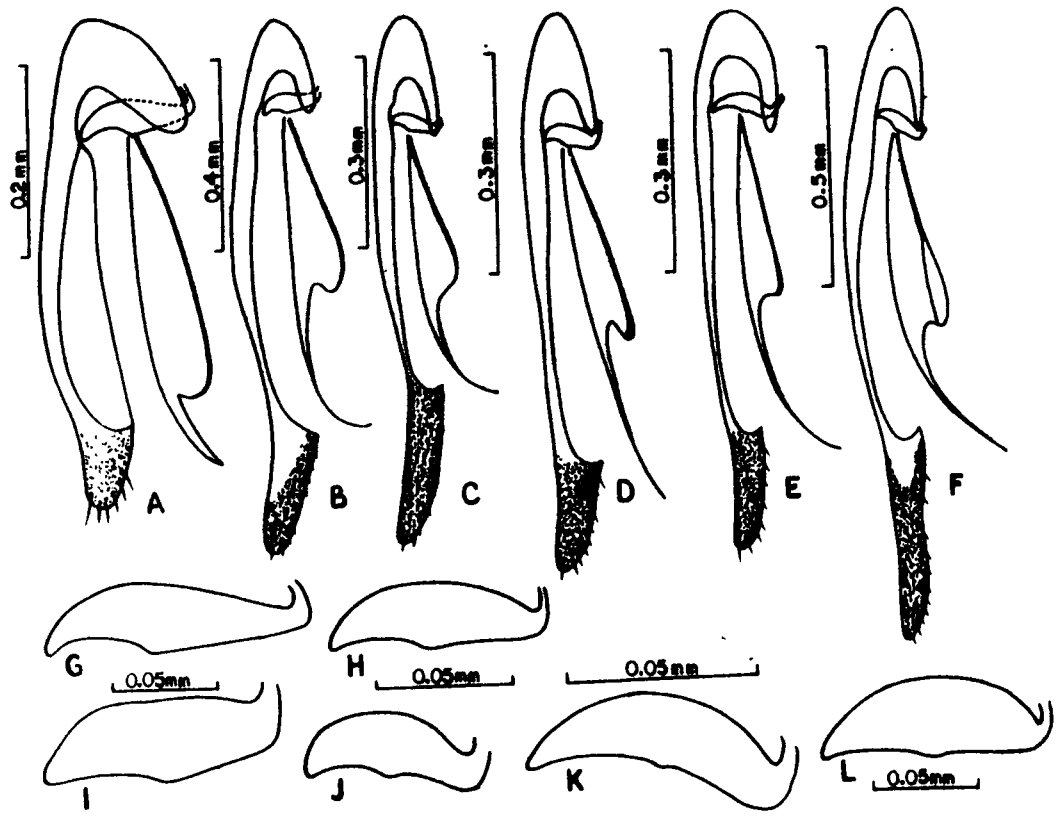
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Fig. 27

Comments: A careful study of the specimens of A. punctulatus Agarwal revealed that in every respect it agrees with the description of A. swezeyi proposed by Timberlake (1919b)

xxvii. Anagyrus diversicornis Mercet

Anagyrus diversicornis Mercet, 1921:134.

Host: Unknown

Distribution: INDIA: Uttar Pradesh.

22. Genus Anagyrietta Ferriere, 1955

Anagyrietta Ferriere, 1955b:121

Type-species: Anagyrietta pantherina Ferriere, by monotypy and original designation.

Leptanusia De Santis, 1963:80 Syn. n.

Type-species: Leptomastidea pseudococci Brethes, by monotypy.

Diagnosis: Head hypognathous; mandibles bidentate; maxillary palpi 4-segmented, labial palpi 3-segmented; antennae (fig. 28 A,H) normal, differently coloured, scape dilated, as long as, shorter or longer than first funicle segment, funicle 6-segmented, at least some segments as long as or longer than wide; club 3-segmented; pronotum (fig. 28 B) with anterior margin concave, posterior margin slightly

convex; mesoscutum without parapsidal furrows; fore wings (fig. 28 C,I) hyaline with coarse and hyaline setae, costal cell narrow, marginal vein (fig. 28 D,J) longer than wide, postmarginal vein well developed or rudimentary, stigmal vein well developed; tenth tergum (fig. 28 E,K) enlarged, paratergites long and narrow; subgenital plate (fig. 28 F,L) semicircular, without antero-lateral apodemes; female genitalia (fig. 28 G,M) with second valvifers of uniform width, outer plate with thickened dorsal marginal ridge, apex without sickle-shaped prolongation.

Comments: The generic diagnosis proposed by De santis (1963) for his genus Leptanusia agrees in every respect with the generic diagnosis of Anagyrietta Ferriere. The genus Anagyrietta has priority over Leptanusia. Therefore, the latter name is suppressed.

The genus is known to contain three species from India and a key for their separation is given below:

Key to Indian species of Anagyrietta Ferriere, based on females

1. Funicle of uniform colour; funicle segment first more than three times as long as wide, as long as or longer than pedicel; fore wings with postmarginal vein as long as or slightly shorter than stigmal vein 2

- Funicle (fig. 28 A) segments 1,4 and 5 white, remaining dark; funicle segment 1st as long as wide, distinctly shorter than pedicel; fore wings with postmarginal vein (fig. 28 D) much

shorter than stigmal vein .....
..... i. brevicornis (Shamim & Shafee) comb.n.

2. Head dorsum slightly less than two times as wide as long; width of frontovertex more than one-third head width; scape (fig. 28 H) brownish with a long whitish strip in middle ....
..... ii. indica (Subba Rao) comb.n.

- *Head dorsum more than two times as wide as long; width of* frontovertex about one-third head width; scape whitish with a long patch on dorsal side at distal half, and an irregular patch on ventral surface .....
..... iii. qadrii (Hayat, Alam & Agarwal) comb.n.

i. Anagyrietta brevicornis (Shamim & Shafee) comb. n.

(Fig. 28 A-G)

Leptanusia brevicornis Shamim & Shafee, 1985b:309.

Material examined: ♀ holotype INDIA: Bihar, Patna, Danapur, ex Ferrisia virgata (Cockerell), 10.i.1984, S.M. Shamim.

Host: Ferrisia virgata (Cockerell)

Distribution: INDIA: Patna.

ii. Anagyrietta indica (Subba Rao) comb. n.

(Fig. 28 H-M)

Leptomastidea indica Subba Rao, 1967:1.

Leptanusia szelenyi Hoffer, 1975:113.

Leptanusia indica Hayat, Alam & Agarwal, 1975:9.

Material examined: 1 ♀. INDIA: Bihar, Ranchi, 10.iv.1986 by sweeping grass, S.M. Shamim.

Host: Ferrisia virgata (Cockerell)

Distribution: Guntur, Ranchi

Comments: Myartseva (1978) synonymized Leptanusia indica Hayat et al. with Leptanusia szelenyi Hoffer. Later, Noyes & Hayat (1984) synonymised Leptanusia indica Hayat et al. with Leptomastidea indica Subba Rao.

iii. Anagyrietta qadrii (Hayat,Alam & Agarwal) comb.n.

Leptanusia qadrii Hayat, Alam & Agarwal, 1975:12.

Anagyrus qadrii (Hayat,Alam & Agarwal); Noyes & Hayat, 1984:230.

Host: Ferrisia virgata (Cockerell).

Distribution: INDIA: Goa.

Fig.28 A-G. Anagyrietta brevicornis (Shamim & Shafee)♀, comb.n.

A. Antenna

B. Pronotum

C. Fore wing

D. Part of fore wing venation

E. Apical terga of abdomen

F. Subgenital plate

G. Part of external genitalia

Fig.28 H-M. Anagyrietta indica (Subba Rao) ♀, comb. n.

H. Antenna

I. Fore wing

J. Part of fore wing venation

K. Apical terga of abdomen

L. Subgenital plate

M. Part of external genitalia

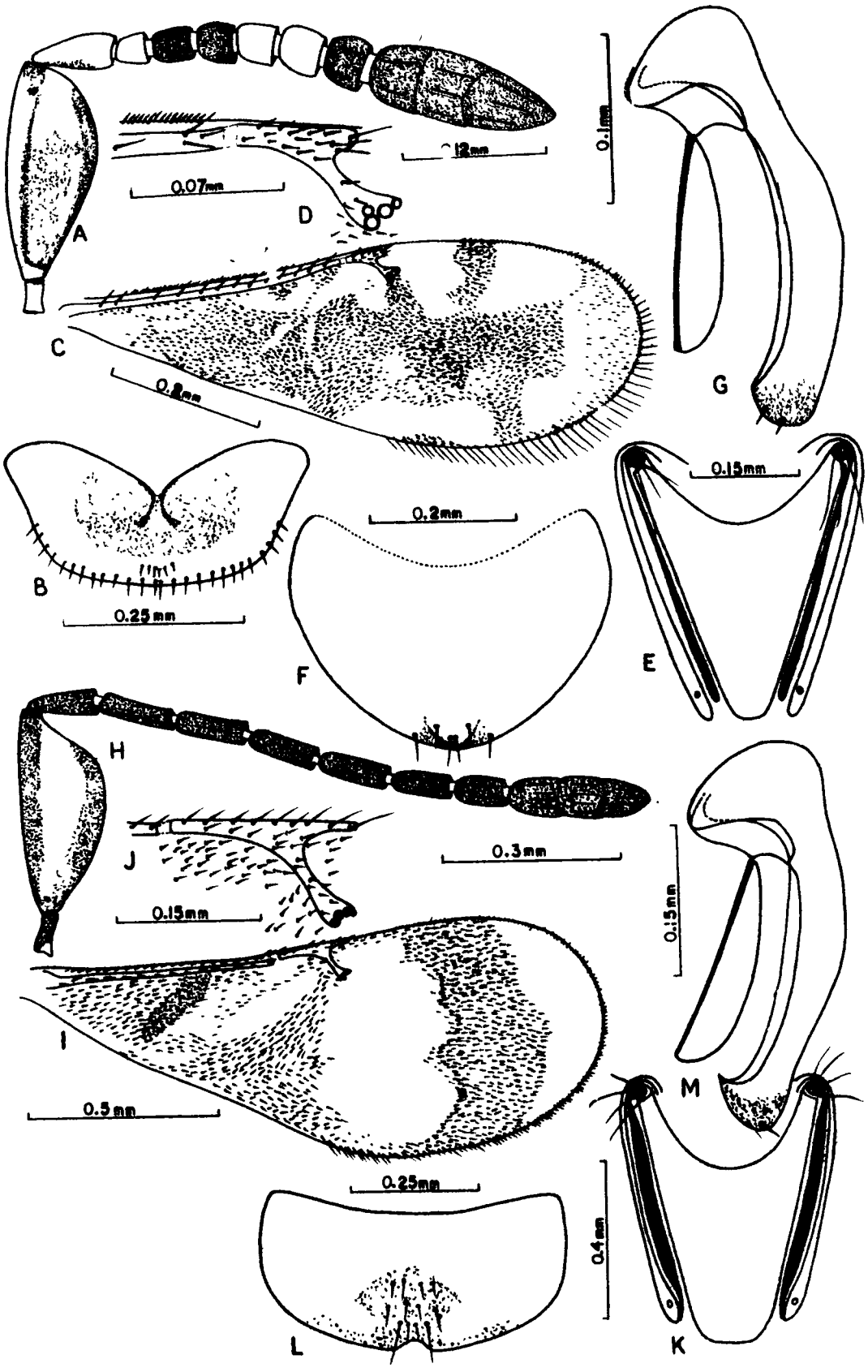
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Fig. 28

23. Genus Gyranusoidea Compere, 1947

Gyranusoidea Compere, 1947a:17.

Type-species: Gyranusa citrina Compere, by original designation.

Diagnosis: Head punctate, hypognathous; mandibles bidentate; maxillary palpi 3-segmented; labial palpi 2-segmented; antennae (fig. 29 A, G, I) with scape dilated, pedicel distinctly longer than first funicle segment, funicle 6-segmented, segments longer than wide; club 3-segmented; pronotum moderately broad, anterior margin deeply concave posterior margin convex; fore wings hyaline, costal cell narrow; marginal, postmarginal and stigmal veins (fig. 29 B, H, J) well developed; tenth tergum (fig. 29 C) enlarged, paratergites long and uniformly narrow; subgenital plate (fig. 29 D) semicircular, without antero-lateral apodemes; female genitalia (fig. 29 E,K) with second valvifers of uniform width, outer plate without sickle-like prolongation apically.

The genus is known to contain five species from India and a key for their separation is given below:

Key to Indian species of Gyranusoidea Compere, based on females

1. Scape much dilated basally, almost three times as long as wide 2

- Scape cylindrical or slightly dilated, four times as long as wide 4

2. Scape twice or more as long as wide, first funicle segment as long as or slightly longer than second, marginal vein longer than stigmal vein 3

- Scape (fig. 29 G) three times as long as wide, first funicle segment distinctly shorter than second; marginal vein (fig. 29 H) as long as stigmal .... i. flava Shafee, Alam & Agarwal

3. Pedicel as long as first funicle segment, scape two times as long as wide, funicle and club yellowish brown .... ii. mirzai (Agarwal)

- Pedicel (Fig. 29 I) longer than first funicle segment, scape slightly more than two times as long as wide, funicle and club dark ..... iii. indica Shafee, Alam & Agarwal

4. Funicle segment first and second subequal in length; marginal vein longer than stigmal vein ..... iv. ceroplastis (Agarwal)

- Funicle segment first shorter than second; marginal vein shorter than stigmal..... v. pallida Alam

i. Gyranusoidea flava Shafee, Alam & Agarwal.

(Fig. 29 F-H)

Gyranusoidea flava Shafee, Alam & Agarwal, 1975:21.

Material examined: ♀ holotype labelled: INDIA: Uttar Pradesh, Nainital, Haldwani, ex Planococcoides robustus Ezzat & McConnell on Mangifera indica Linn. 14.vi.1967, S. Adam Shafee.

Host: Planococcoides robustus Ezzat & McConnell

Distribution: INDIA: Uttar Pradesh, Maharashtra, Orissa.

ii. Gyranusoidea mirzai (Agarwal)

(Fig. 29 A-E)

Anagyrus mirzai Agarwal, 1965:46.

Gyranusoidea mirzai (Agarwal); Noyes & Hayat, 1984:260.

Anagyrus delhiensis Subba Rao & Rai, 1970:89.

Material examined: 1♀, INDIA: Bihar, Ranchi, ex Ferrisia virgata (Cockerell), 3.xi.1985, S.M. Shamim.

Hosts: Ferrisia virgata (Cockerell)

Icerya formicarum Newstead

Nipaecoccus sp.

Nipaecoccus viridis (Newstead)

Planococcus citri (Risso)

Rastrococcus iceryoides (Green)

Distribution: Widely distributed in India.

iii. Gyranusoidea indica Shafee, Alam & Agarwal (Fig. 29 I-K)

Gyranusoidea indica Shafee, Alam & Agarwal, 1975:22.

Material examined: ♀ holotype labelled: INDIA: Bihar, Arrah, Sasaram, ex Nipaecoccus sp. on Zyzyphus sp., 2.xi.1969, S. Adam Shafee.

Host: Nipaecoccus sp.

Nipaecoccus virdis (Newstead)

Distribution: INDIA: Bihar, Uttar Pradesh.

iv. Gyranusoidea ceroplastis (Agarwal)

Ericydnus ceroplastis Agarwal, 1965:73.
Gyranusoidea ceroplastis (Agarwal); Hayat, 1986:100.

Host: Coccid

Distribution: INDIA: Aligarh.

v. Gyranusoidea pallida Alam

Gyranusoidea pallida Alam, 1972:132.

Host: Ceroplastes rubens ?

Mealy bug

Distribution: INDIA: Aligarh.

Fig.29 A-E. Gyranusoidea mirzai (Agarwal), ♀

A. Antenna

B. Part of fore wing venation

C. Apical terga of abdomen

D. Subgenital plate

E. Part of external genitalia

Fig.29 F-H. Gyranusoidea flava Shafee, Alam & Agarwal ♀

F. Head

G. Antenna

H. Part of fore wing venation

Fig.29 I-K. Gyranusoidea indica Shafee, Alam & Agarwal ♀

I. Antenna

J. Part of fore wing venation

K. Part of external genitalia

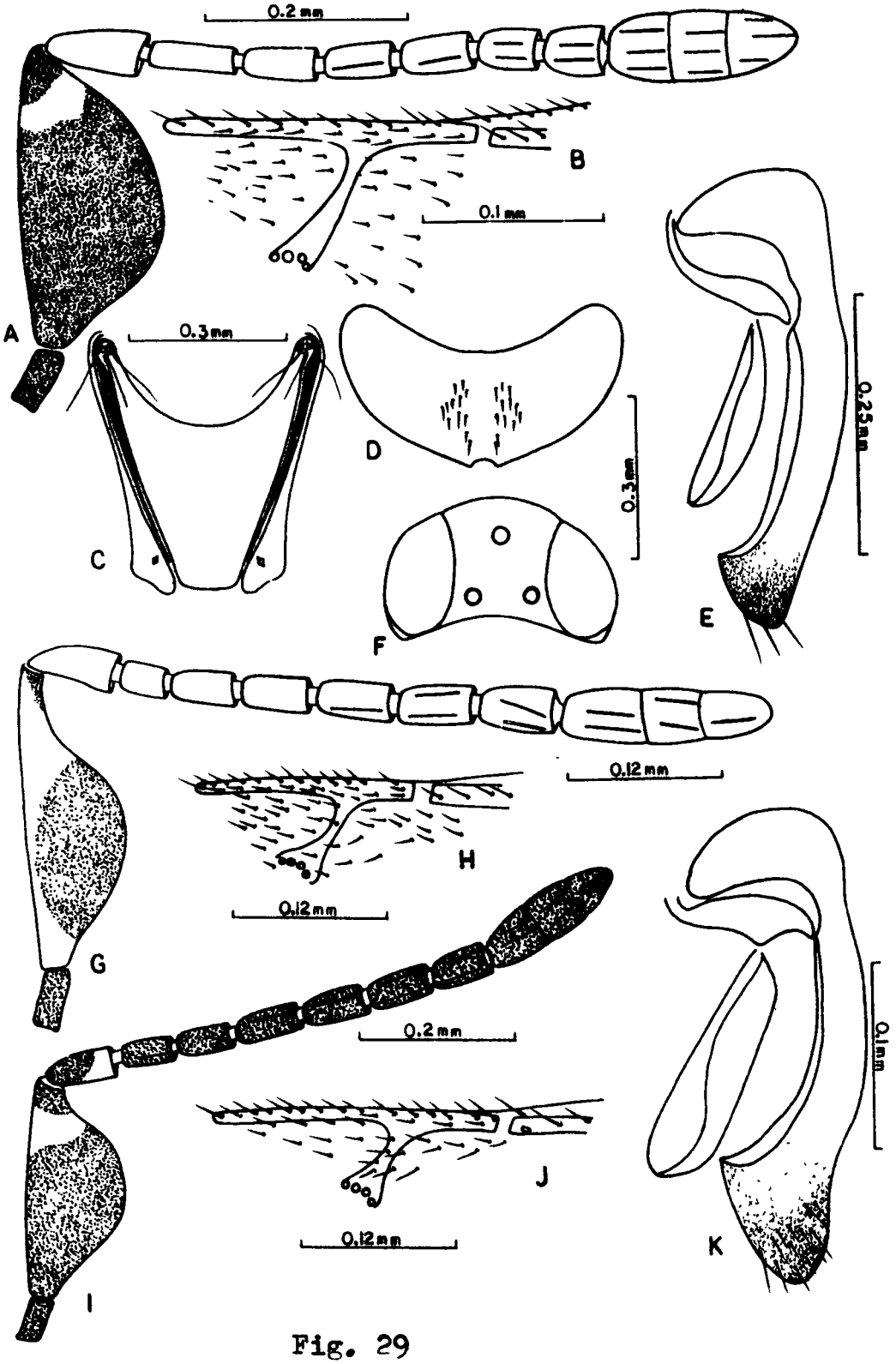
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Fig. 29

24. Genus Leptomastidea Mercet, 1916

Leptomastidea Mercet, 1916b:112.

Type-species: Leptomastidea aurantiaca Mercet, by monotypy.

Tanaomastix Timberlake, 1918:362.

Type-species: Paraleptomastix abnormis Girault, by original designation.

Diagnosis: Head hypognathous; mandibles bidentate; maxillary palpi 3-segmented, labial palpi 2-segmented; antennae (fig. 30 B) normal, scape long and cylindrical, pedicel longer than first funicle segment, funicle 6-segmented, segments longer than wide, club 3-segmented; mesoscutum without parapsidal furrows; fore wings (fig. 30 C) well developed, hyaline, costal cell very narrow, marginal vein (fig. 30 D) longer than wide, as long as postmarginal vein and longer than stigmal, stigmal vein dilated apically; tenth tergum enlarged, paratergites long and narrow.

The genus is known to contain single species from India.

i. Leptomastidea shafeei Noyes & Hayat

(Fig. 30 A-D)

Leptomastidea indica Shafee, Alam & Agarwal, 1975:24; Preoccupied by indica Subba Rao, 1967.

Fig.30 A-D. Leptomastidea shafeei Noyes & Hayat, ♀

A. Head, dorsal view

B. Antenna

C. Fore wing

D. Part of fore wing venation

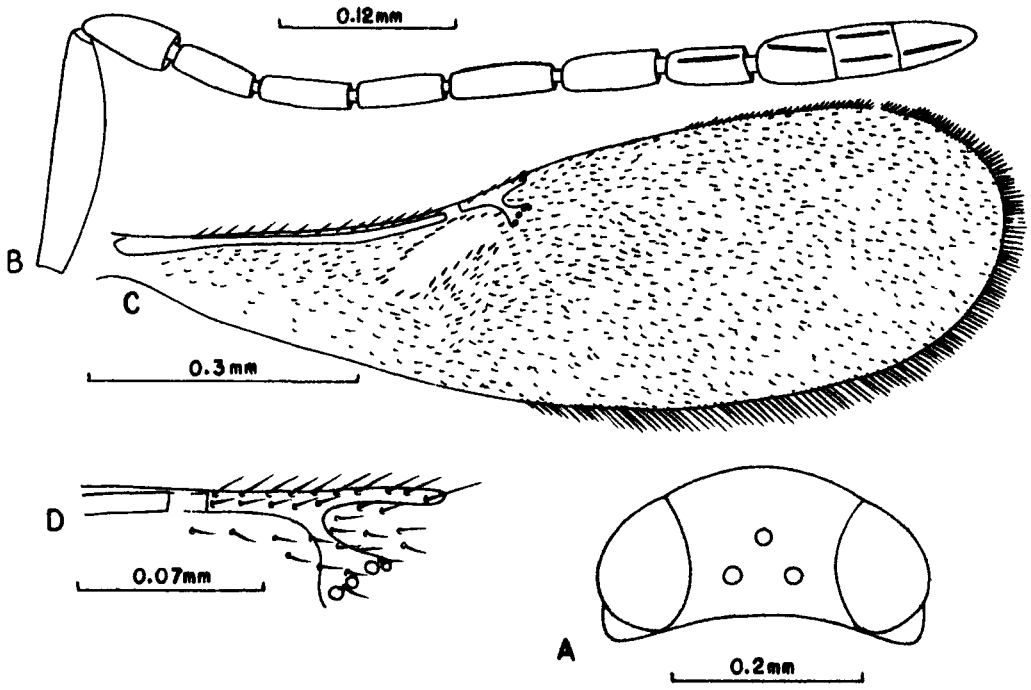

Fig. 30

Leptomastidea shafeei Hayat & Subba Rao, 1981:114

Replacement name for indica Shafee, Alam & Agarwal nec Subba Rao

Material examined: ♀ holotype labelled: INDIA: Bihar, Darbhanga, Samastipur, ex Coccid, on wild plant, 8.xi. 1969, S. Adam Shafee.

Host: Coccid

Distribution: INDIA: Darbhanga.

25. Genus Doliphoceras Mercet, 1921

Doliphoceras Mercet, 1921:91.

Type-species: Pholidoceras integralis Mercet, by monotypy and original designation.

Diagnosis: Head smooth, hypognathous; mandibles bidentate; maxillary palpi 3-segmented, labial palpi 2-segmented; antennae (fig. 30 A) normal, scape cylindrical or moderately dilated, pedicel longer than first funicle segment, funicle 6-segmented, segments longer than broad, club 3-segmented; pronotum (fig. 30 B) of uniform width, anterior margin concave, posterior margin slightly convex with a submarginal ridge; mesoscutum without parapsidal furrows; fore wings hyaline, costal cell broad, marginal vein (fig. 30 C) as long as

stigmal and longer than postmarginal vein; tenth tergum (fig. 30 D) enlarged, moderately narrow apically, paratergites long and narrow; subgenital plate (fig. 30 G) V-shaped with well developed antero-lateral apodemes; female genitalia (fig. 30 E) with second valvifers long and narrow with finger-like prolongation apically, outer plate with long sickle-shaped prolongation apically.

The genus is known to contain two species from India and a key for their separation is given below:

Key to Indian species of Doliphoceras Mercet, based on females

1. Scape nearly four times as long as wide, pedicel less than twice as long as wide, funicle segments 1-6 subequal in length, each twice as long as wide; tenth tergum testaceous; malar sutures distinct ..... i. gracilis Hayat

\- Scape (fig. 31 A) three times as long as wide, pedicel twice as long as wide, funicle segment first longest, segments 1-6 each less than twice as long as wide; tenth tergum dark; malar sutures indistinct ..... ii. biharensis Shamim & Shafee

i. Doliphoceras gracilis Hayat

Doliphoceras gracilis Hayat, 1970a:144.

Host: Mealy bug

Distribution: INDIA: Andhra Pradesh, Delhi, Kerala, Maharashtra, Uttar Pradesh.

ii. Doliphoceras biharensis Shamim & Shafee
(Fig. 31 A-G)

Doliphoceras biharensis Shamim & Shafee, 1985a:35.

Material examined: ♀ holotype labelled: INDIA: Bihar, Ranchi, Mesra, ex Coccidohystrix insolitus (Green), on Solanum sp., 10.x.1983, S.M. Shamim.

Host: Coccidohystrix insolitus (Green)

Distribution: INDIA: Ranchi.

26. Genus Mashhoodia Shafee, 1972

Mashhoodia Shafee, 1972 a:159

Type-species: Mashhoodia indica Shafee, by monotypy.

Diagnosis: Head smooth, hypognathous; mandibles bidentate; maxillary palpi 4-segmented, labial palpi 3-segmented; antennae (figs. 1; 32 A) uniform yellow, scape cylindrical, or slightly dilated, pedicel slightly longer than first funicle segment, funicle 6-segmented, segments as long as or longer than wide, club

Fig.31 A-G. Doliphoceras biharensis Shamim & Shafee, ♀

A. Antenna

B. Pronotum

C. Part of fore wing venation

D. Apical terga of abdomen

E. Part of external genitalia

F. First valvifer

G. Subgenital plate

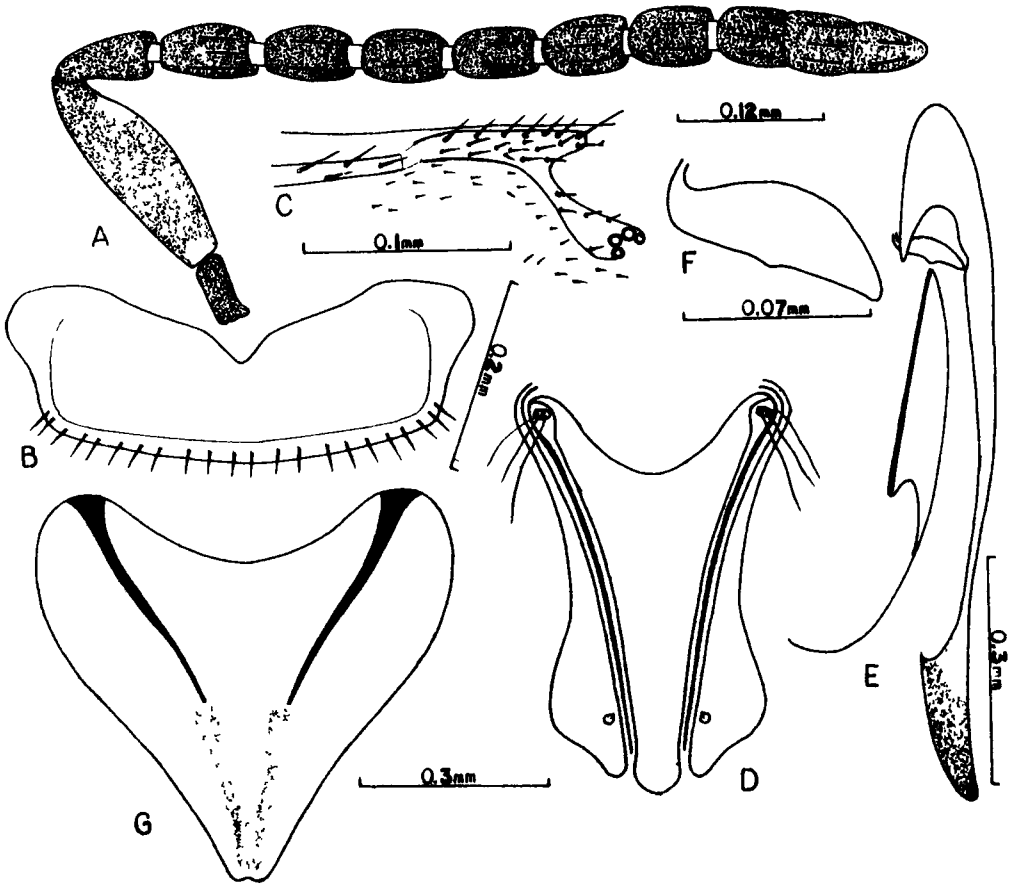

Fig. 31

3-segmented; pronotum broad, anterior margin concave, posterior margin convex; mesoscutum without parapsidal furrows; fore wings (fig. 32 B) hyaline, costal cell broad, marginal vein longer than wide, postmarginal and stigmal veins well developed; tenth tergum (fig. 32 C) enormously enlarged, paratergites long and narrow; subgenital plate (fig. 32 D) semicircular, without antero-lateral apodemes; female genitalia (figs. 2; 32 E) with second valvifers of uniform width, outer plate with dorsal marginal inflection.

The genus is known to contain two species from India and a key for their separation is given below:

Key to Indian species of Mashhoodia Shafee, based on females

1. Scape (fig. 1) four times as long as wide; four wings with distinct areas of black and transparent setae, marginal vein much shorter than postmarginal vein ..... i. indica Shafee
- Scape (fig. 32 A) three times as long as wide; fore wings (fig. 32 B) entirely with black setae, marginal vein longer than postmarginal vein .... ii. flava Shafee

i. Mashhoodia indica Shafee

(Fig. 1,2)

Mashhoodia indica Shafee, 1972a:159.

Material examined: ♀ holotype labelled: INDIA: Karnataka, Bangalore, ex Phenacoccus indicus (Avasthi & Shafee), 29.vi.1968, S. Adam Shafee

Host: Phenacoccus indicus (Avasthi & Shafee)

Distribution: INDIA: Bangalore.

ii. Mashhoodia flava Shafee

(Fig. 32 A-E)

Mashhoodia flava Shafee, 1972b:327.
Anagyrus ferus Noyes & Hayat, 1984:229 Syn. n.

Material examined: ♀ holotype labelled: INDIA: Karnataka, Bangalore, ex Phenacoccus indicus (Avasthi & Shafee) 29.vi.1968, S. Adam Shafee.

Host: Phenacoccus indicus (Avasthi & Shafee)

Distribution: INDIA: Bangalore.

Comments: Noyes & Hayat (1984) incorrectly shifted Mashhoodia flava to Anagyrus. Further they proposed the replacement name ferus for flava Shafee not Ishii. A detailed study reveals that the original placement of flava Shafee under the genus Mashhoodia is correct.

Fig.32 A-E. Mashhoodia flava Shafee, ♀

A. Antenna

B. Fore wing

C. Apical terga of abdomen

D. Subgenital plate

E. Part of external genitalia

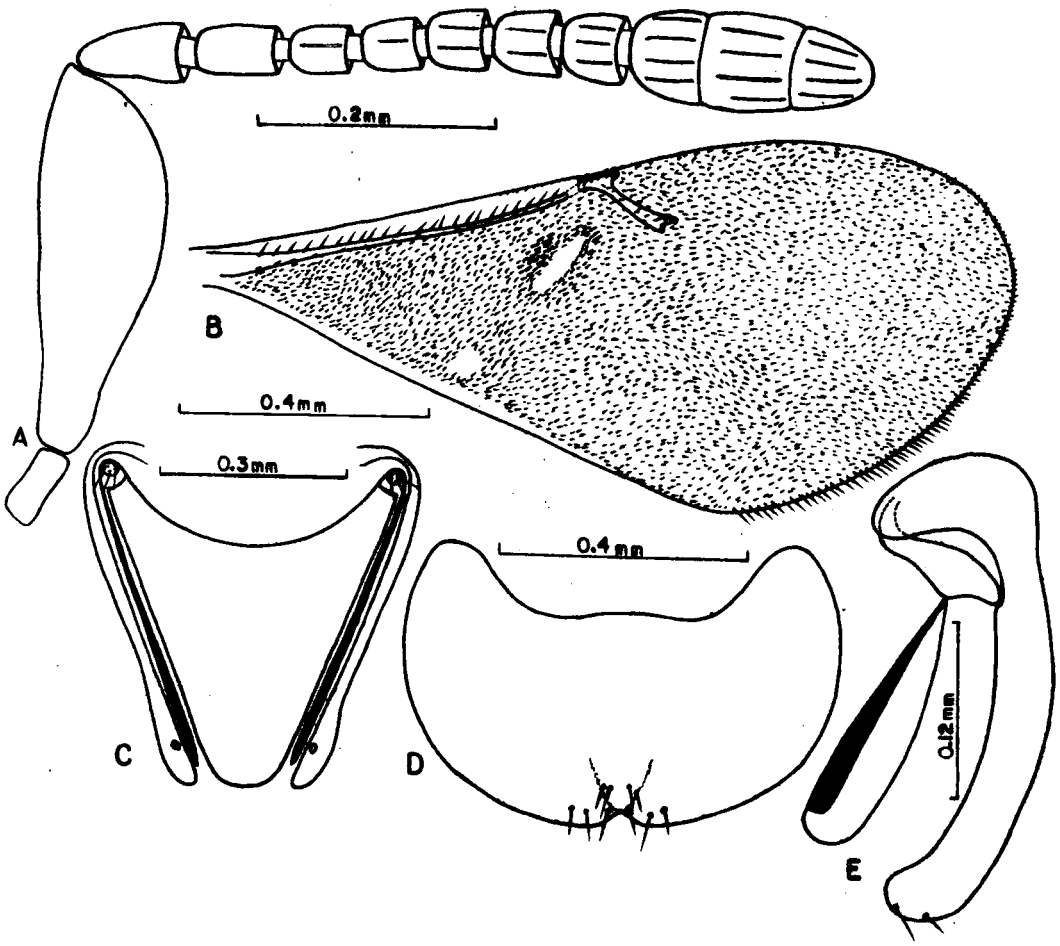

Fig. 32

27. Genus Bacalusa Noyes & Hayat

Bacalusa Noyes & Hayat, 1984:239.

Type-species: Bacalusa fuscipennis Noyes & Hayat, by original designation.

Diagnosis: Head hypognathous; mandibles (fig. 33 I) bidentate; maxillary palpi 3-segmented, labial palpi 2-segmented; antennae (fig. 33 J) normal, scape cylindrical, pedicel distinctly longer than first funicle segment, funicle 6-segmented, all segments longer than wide, club 3-segmented; pronotum (fig. 33 K) of uniform width, with anterior margin concave, posterior margin straight; mesoscutum with parapsidal furrows; fore wings (fig. 33 L) hyaline with distinct fuscous pattern, costal cell narrow, marginal vein (fig. 33 M) distinctly longer than wide, as long as or longer than postmarginal and slightly longer than stigmal; tenth tergum (fig. 33 N) enlarged, paratergites long and widened medially, subgenital plate (fig. 33 O) semicircular, without antero-lateral apodemes; female genitalia (fig. 33 P) with second valvifers of uniform width, outer plate of uniform width with thickened dorsal margin, without sickle-shaped prolongation.

The genus is known to contain single species from India.

i. Bacalusa fuscipennis Noyes & Hayat

(Fig. 33 I-O)

Bacalusa fuscipennis Noyes & Hayat, 1984:240.

Material examined: ♀ Paratype labelled: INDIA: Uttar Pradesh, Aligarh, 12.xii.1979, M. Verma.

Host: Unknown

Distribution: INDIA: Tamil Nadu, Uttar Pradesh.

28. Genus Apodoliphoceras gen. n.

Type-species: Doliphoceras tachikawai Shafee, Alam & Agarwal by monotypy.

Diagnosis: Head slightly wider than long in facial view; malar space longer than eye width; malar sutures present; mandibles bidentate; maxillary palpi 3-segmented, labial palpi 2-segmented (fig. 33 A); antennae (fig. 33 B) 11-segmented, inserted below lower level of eyes; scape cylindrical; pedicel longer than first funicle segment; funicle 6-segmented, all segments longer than broad; club 3-segmented; pronotum (fig. 33 C) of uniform width, anterior margin concave, posterior margin slightly convex without submarginal ridge; mesoscutum without parapsidal furrows; fore wings well developed, hyaline, costal cell broad, marginal vein (fig. 33 D) distinctly longer than postmarginal and about as long as stigmal, stigmal vein

dilated apically; middle tibial spur (fig. 33 E) slightly shorter than basitarsus; tarsi 5-segmented. Abdomen slightly longer than thorax, tenth tergum (fig. 33 F) long, partergites long, widened medially; subgenital plate with posterior margin broadly rounded, antero-lateral apodemes absent; female genitalia with second valvifers (fig. 33 H) of uniform width, outer plate with thickened dorsal margin.

Comments: The new genus is closely related to Bacalusa Noyes & Hayat from which it can be separated by absence of parapsidal furrows on mesoscutum, uniformly hyaline fore wings with broad costal cell.

i. Apodoliphoceras tachikawai (Shafee, Alam & Agarwal) comb.n.
(Fig. 33 A-H)

Doliphoceras tachikawai Shafee, Alam & Agarwal, 1975:26.
Bacalusa tachikawai (Shafee, Alam & Agarwal); Noyes & Hayat, 1984:240

Material examined: ♀ holotype, 4 ♀ paratypes labelled: INDIA: Rajasthan, Jaipur, Ramgarh bundh, ex Coccidohystrix insolitus (Green) on Achyranthes sp., 26.ix.1970, S. Adam Shafee.

Host: Coccidohystrix insolitus (Green)

Distribution: INDIA: Jaipur, Ajmer.

Fig.33 A-H. Apodoliphoceras tachikawai (Shafee, Alam & Agarwal)♀, comb.n.

A. Maxillary & labial palpi

B. Antenna

C. Pronotum

D. Part of fore wing venation

E. Part of middle leg

F. Apical terga of abdomen

G. First valvifer

H. Second valvifer

Fig.33 I-O. Bacalusa fuscipennis Noyes & Hayat, ♀

I. Mandible

J. Antenna

K. Pronotum

L. Fore wing

M. Part of fore wing venation

N. Apical terga of abdomen

O. Subgenital plate

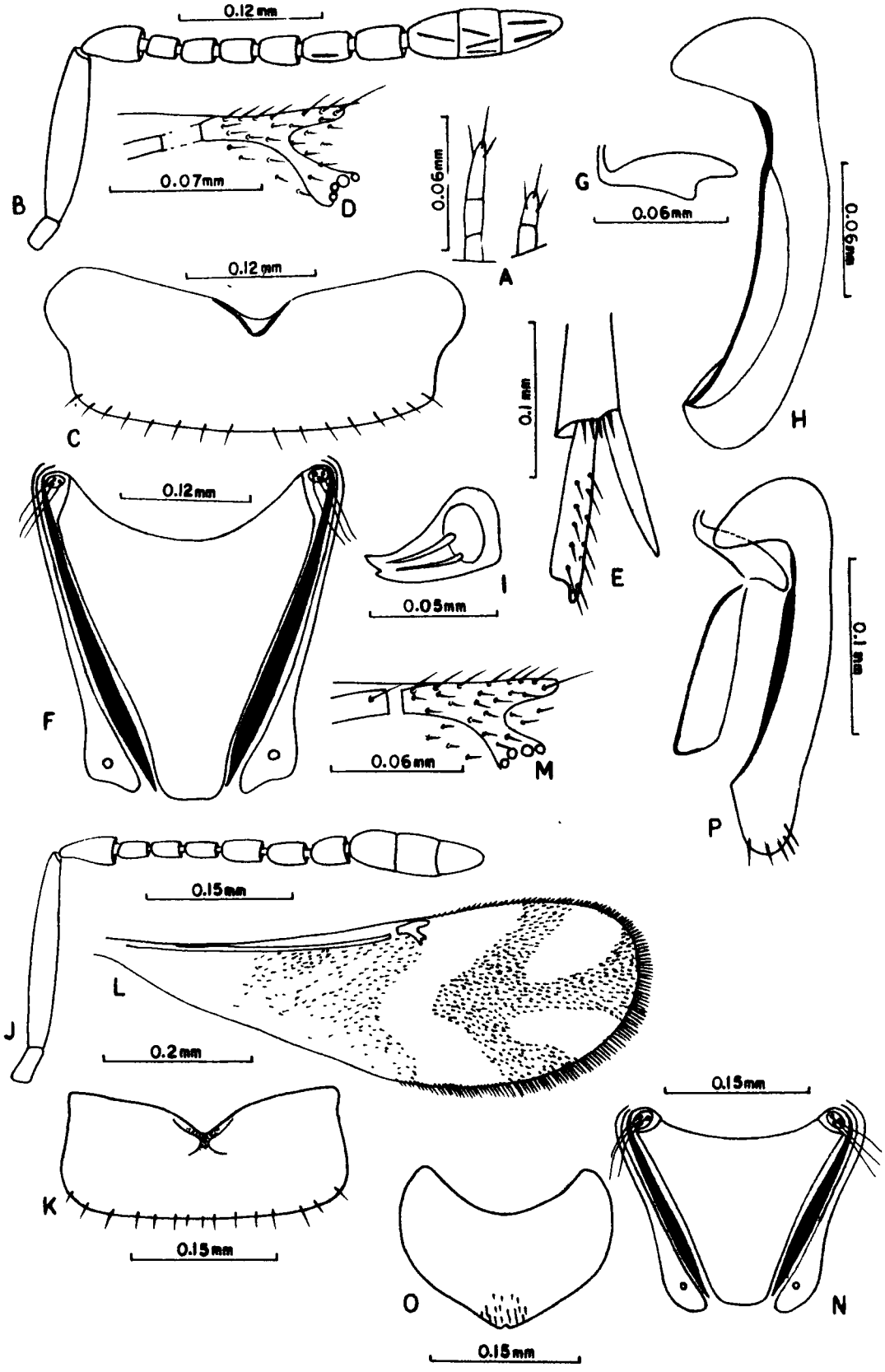
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Fig. 33

e. SUBTRIBE RHOPINA ERDOS & NOVICKY

Rhopina, Erdos & Novicky, 1955:166

Rhopina, Trjapitzin, 1973a:171

Diagnosis: Body small, yellow, dorsoventrally flattened; head prognathous; mandibles bidentate; maxillary palpi (fig. 35 G) 2-segmented, labial palpi 1-segmented; antennae (figs. 34 A, 35 A, H,K) normal, never flattened; pronotum (figs. 34 B; 35 B) with a marked constriction medially; mesoscutum without parapsidal furrows; fore wings with costal cell moderately broad to narrow; tenth tergum (figs. 34 D; 35 D) much enlarged, paratergites long and narrow; female genitalia (figs. 34 F; 35 E,J) with second valvifers of uniform width.

The subtribe is known to contain four genera from India and their separation is given in key to genera.

29. Genus Platyrhopus Erdos, 1955

Platyrhopus Erdos, 1955:40.

Type-species: Platyrhopus delitescens Erdos, by monotypy and original designation.

Diagnosis: Body yellow, dorsoventrally flattened; head prognathous; frontovertex wider than long; antennae (fig. 34 A) with scape cylindrical, funicle 6-segmented, club 3-segmented; fore wings hyaline, finely setose, with well defined speculum, marginal vein (fig. 34 C) developed, postmarginal vein rudimentary, marginal fringe short; subgenital plate (fig. 34 E) with well developed anterolateral apodemes; female genitalia (fig. 34 F) with apex of second valvifer having finger-like prolongation, outer plate with a sickle-shaped prolongation apically.

The genus is known to contain single species Platyrhopus aligarhensis sp. n. from India.

Platyrhopus aligarhensis sp.n.

(Fig. 34 A-G)

Female

Head yellowish brown wider than long in facial view; frontovertex wider than long; ocelli arranged in obtuse triangle, lateral ocellus removed from eye and occipital margins by its own diameter; eyes dark brown; mandibles bidentate; maxillary palpi 2-segmented, labial palpi 1-segmented. Antennae (fig. 34 A) dark brown, except apical portion of club yellowish brown; scape three times as long as wide; pedicel distinctly longer than first funicle segment; funicle

6-segmented, first segment longest, distinctly longer than wide, segments 2-4 as long as wide, 5 and 6 distinctly wider than long; club 3-segmented, less than three times as long as wide, longer than preceding three funicle segments combined.

Thorax yellowish; pronotum (fig. 34 B) with marked constriction medially. Forewings hyaline, less than three times as long as wide; costal cell broad; stigmal vein (fig. 34 C) as long as marginal and postmarginal veins combined; speculum complete; marginal fringe short. Hind wings hyaline, three curved hooklets at apex of marginal vein. Legs orange yellow, mid tibial spur shorter than basitarsus.

Abdomen brownish, longer than head and thorax together; tenth tergum (fig. 34 D) long, paratergites long and narrow; subgenital plate (fig. 34 E) with well developed antero-lateral apodemes; external genitalia (fig. 34 F) with first valvifer semicircular, second valvifer having finger-like prolongation apically, outer plate with sickle-shaped prolongation.

Body length: 1.2 mm.

Holotype ♀,4 ♀ paratypes INDIA: Uttar Pradesh, Aligarh, ex Adelosoma phragmitidis Borchenius on Bambosa sp., 20.x.1985, M.Y. Khan and M. Khalid.

Fig.34 A-G. Platyrhopus aligarhensis sp. n., ♀

A. Antenna

B. Pronotum

C. Part of fore wing venation

D. Apical terga of abdomen

E. Subgenital plate

F. Part of external genitalia

G. First valvifer

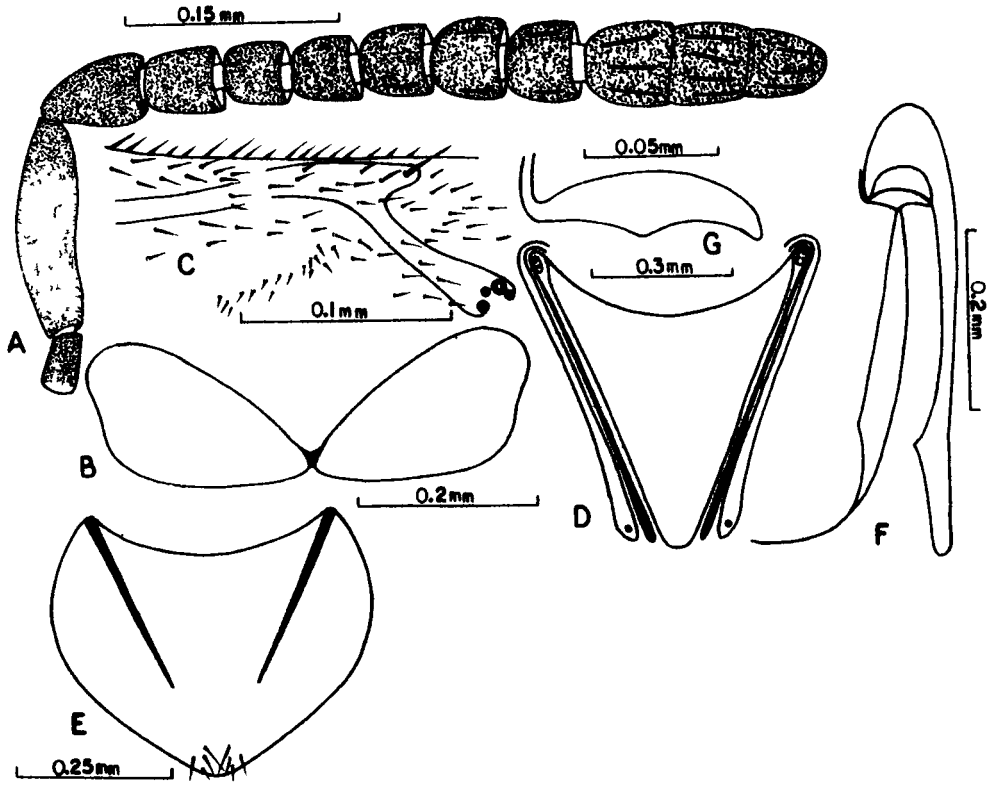

Fig. 34

30. Genus Rhopus Foerster, 1856

Rhopus Foerster, 1856:34.

Type-species: Encyrtus piso Walker, by monotypy and original designation.

Mirastymachus Girault, 1915a:166.

Type-species: Mirastymachus europaeus Girault, by original designation.

Diagnosis: Body yellow, dorsoventrally flattened; head prognathous; frontovertex slightly wider than long; antennae with scape cylindrical, funicle 6-segmented, club 3-segmented; fore wings hyaline, finely setose, with well defined speculum, marginal vein developed, postmarginal vein rudimentary, marginal fringe short; subgenital plate without antero-lateral apodemes; female genitalia with apex of second valvifer blunt, outer plate without a sickle- shaped prolongation apically.

The genus is known to contain three species from India and a key for their separation is given below:

Key to Indian species of Rhopus Foerster, based on females.

1. Pedicel shorter than following two funicle segments combined 2

- Pedicel longer than following two funicle segments combined; antennae yellowish while with distal two segments of club brownish ..... i.gramineus Hayat

2. First funicle segment as long as wide; club as long as preceding four funicle segments combined; antennae completely brownish ..... ii. desantisiellus Ghesquire

- First funicle segment longer than wide; club about as long as funicle, funicle segments 1-4 and club orange, apex of pedicel and funicle segments 5-6 white .... iii. sacchari (Alam)

i. Rhopus gramineus Hayat

Rhopus gramineus Hayat, 1970a:110.

Host: Antonina sp.

Distribution: India: Patiala.

ii. Rhopus desantisiellus Ghesquiere

Rhopus desantisiellus Ghesquiere, 1957:18.

Rhopus desantisiellus Ghesquiere; De Santis, 1963:53-56.

Host: Sugar-cane mealy bug

Distribution: India: Udaipur.

iii. Rhopus sacchari (Alam)

Xanthoencyrtus sacchari Alam, 1961:239.

Rhopus sacchari (Alam); Noyes & Hayat, 1984:333.

Host: Ripersia sacchari (Green)

Distribution: India: Pusa.

31. Genus Xanthoencyrtus Ashmead,1902

Xanthoencyrtus Ashmead, 1902:302.

Type-species: Xanthoencyrtus nigroclavatus Ashmead, by monotypy.

Scelioencyrtus Girault, 1915a:161.

Type-species: Scelioencyrtus nigriclavus Girault, by original designation.

Pholidoceras Mercet, 1918:237.

Type-species: Pholidoceras brachyptera Mercet, by monotypy and original designation.

Pholidocerodes Ferriere, 1956:358.

Type-species: Pholidoceras parvula Mercet, by monotypy and original designation.

Diagnosis: Body yellow, dorsoventrally flattened; head prognathous; frontovertex wider than long; antennae (fig. 35 A,H)

with scape cylindrical, funicle 6-segmented, club 2-segmented; fore wings hyaline, finely setose, with well defined speculum, marginal vein (fig. 35 C,I) developed, postmarginal vein rudimentary, marginal fringe short; subgenital plate (fig. 35 F) without anterolateral apodemes, female genitalia (fig. 35 E,J) with apex of second valvifer blunt, outer plate without sickle-shaped prolongation apically.

The genus is known to contain three species from India and a key for their separation is given below:

Key to Indian species of Xanthoencyrtus Ashmead, based on females

1. Pedicel less than twice as long as wide 2
- Pedicel (fig. 35 H) twice as long as wide, slightly longer than following two funicle segments combined; first funicle segment slightly longer than wide; club as long as preceding five funicle segments combined .... i. qadrii Shafee, Alam & Agarwal
2. Pedicel as long as following two funicle segments together; club longer than funicle ..... ii. fullawayi Timberlake
- Pedicel (fig. 35 A) as long as following three funicle segments together; club shorter than funicle .... iii. longiclavatus Shafee, Alam & Agarwal

i. Xanthoencyrtus qadrii Shafee, Alam & Agarwal
(Fig. 35 G-J)

Xanthoencyrtus qadrii Shafee, Alam & Agarwal, 1975:30.

Material examined: ♀ holotype INDIA: Uttar Pradesh, Almora, Ranikhet, Choubatia, ex Ripersia sp. on grass, 21.vi.1967, S. Adam Shafee.

Host: Ripersia sp.

Distribution: INDIA: Almora.

ii. Xanthoencyrtus fullawayi Timberlake

Xanthoencyrtus fullawayi Timberlake, 1919b:204.
Xanthoencyrtus comperei Subba Rao, 1960:276.

Host: Saccharicoccus sacchari (Cockerell)

Distribution: INDIA: Delhi.

iii. Xanthoencyrtus longiclavatus Shafee, Alam & Agarwal
(Fig. 35 A-F)

Xanthoencyrtus longiclavatus Shafee, Alam & Agarwal, 1975:31.

Material examined: ♀ holotype INDIA: Bihar, Motihari, Narkatiaganj, ex Maconellicoccus hirsutus (Green), 16.ii. 1970, S. Adam Shafee.

Host: Maconellicoccus hirsutus (Green)

Distribution: INDIA: Motihari.

32. Genus Hamusencyrtus Subba Rao & Hayat, 1979

Hamusencyrtus Subba Rao & Hayat, 1979:2.

Type-species: Scelioencyrtus mymaricoides Compere, Subba Rao & Kaur, by original designation.

Neoxanthoencyrtus Avasthi & Shafee, 1980:535.

Type-species: Scelioencyrtus indicus Shafee, Alam & Agarwal, by original designation.

Diagnosis: Body yellow, dorsoventrally flattened; head prognathous; frontovertex wider than long; antennae (fig. 35 K) with scape cylindrical, funicle 6-segmented, club 2-segmented; fore wings (fig. 35 L) hyaline, sparsely and indistinctly setose, without speculum, marginal vein punctiform, postmarginal vein rudimentary, marginal fringe long; subgenital plate without antero-lateral apodemes; female genitalia with apex of second valvifer blunt, outer plate without a sickle-shaped prolongation apically.

The genus is known to contain two species from India and a key for their separation is given below:

Key to Indian species of Hamusencyrtus Subba Rao & Hayat, based on females.

1. First funicle segment slightly longer than wide, 2-6 slightly wider than long, club as long as preceding four funicle segments combined; marginal fringe of fore wing one-half the greatest wing width .... i. mymaricoides (Compere, Subba Rao & Kaul)

- First funicle segment (fig. 35 K) as long as wide, 2-5 one and a half times wider than long, sixth distinctly wider than long, club longer than preceding four funicle segments combined; marginal fringe of fore wings (fig. 35 L) more than one-half the greatest wing width ..... ii. indicus (Shafee, Alam & Agarwal)

i. Hamusencyrtus mymaricoides (Compere, Subba Rao & Kaul)

Scelioencyrtus mymaricoides Compere, Subba Rao & Kaur, 1960:46.
Hamusencyrtus mymaricoides (Compere, Subba Rao & Kaul); Noyes & Hayat, 1984:283.

Host: Pseudococcids

Distribution: India: Delhi.

ii. Hamusencyrtus indicus (Shafee, Alam & Agarwal)

(Fig. 35 K-M)

Scelioencyrtus indicus Shafee, Alam & Agarwal, 1975:33.

Hamusencyrtus indicus (Shafee, Alam & Agarwal); Noyes & Hayat, 1984:283.

Material examined: ♀ holotype labelled: INDIA: Bihar, Muzaffarpur, Jhapa, ex. Saccharicoccus sacchari (Cockerell) on Saccharum officinarum Linn., 5.xi.1969, S. Adam Shafee.

Host: Saccharicoccus sacchari(Cockerell)

Distribution: India: Bihar.

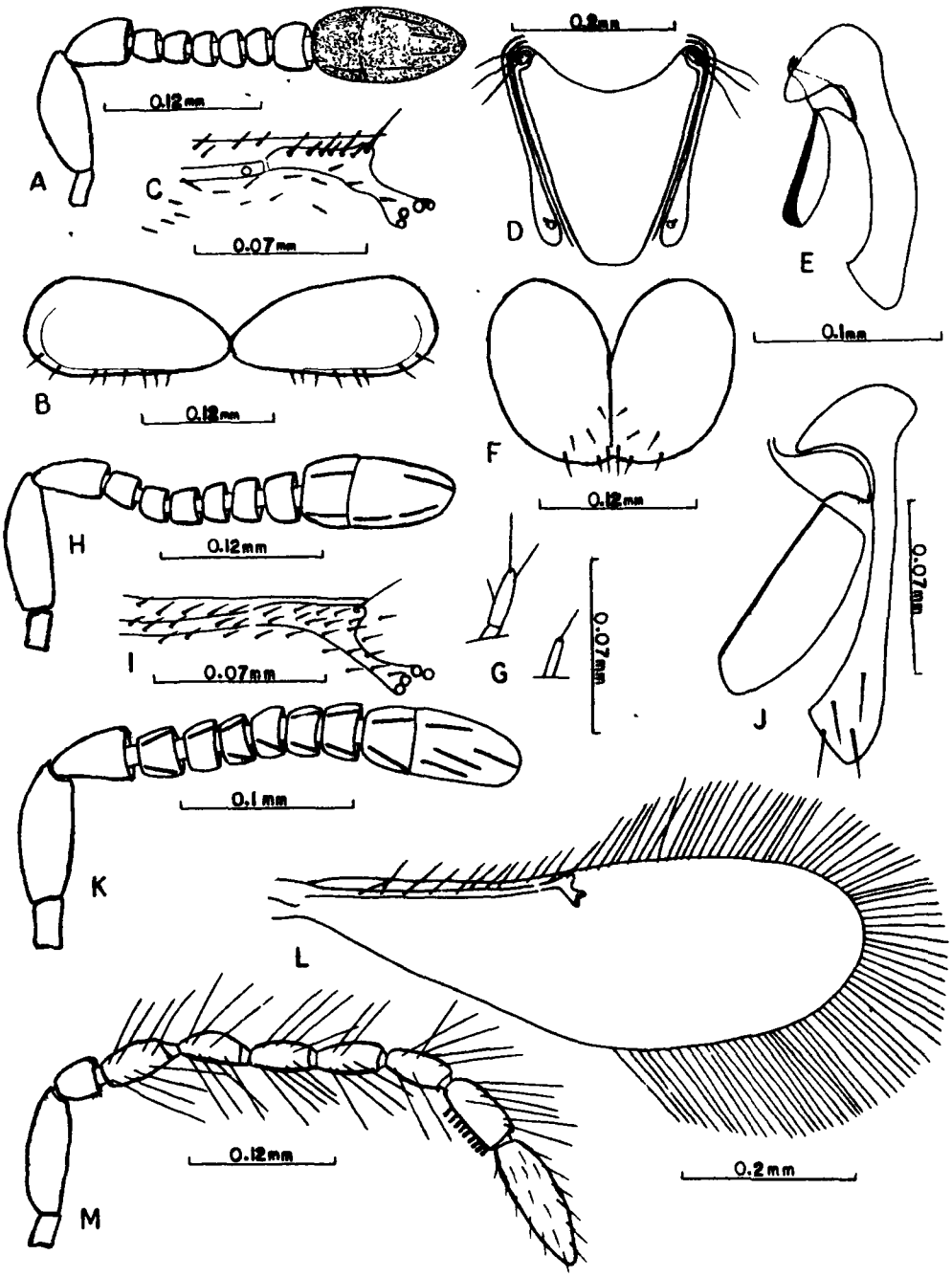
A
0.12mm
C
0.07mm
D
E
0.1mm
B
0.12mm
F
0.12mm
H
0.12mm
I
0.07mm
G
0.07mm
J
0.07mm
K
0.1mm
L
0.2mm
M
0.12mm

Fig. 35

V. APPENDIX A. TETRACNEMINE PARASITES AND THEIR HOSTS, IN INDIA

Parasite	Host
1. *Aenasius advena* Compere	*Ferrisia virgata* (Cockerell)
2. *Alamella flava* Agarwal	*Nipaecoccus* sp.
	Nipaecoccus vastator (Maskell)
3. *Anagyrietta brevicornis* (Shamim & Shafee)comb.n.	*Ferrisia virgata* (Cockerell)
4. *Anagyrietta indica* (Subba Rao) comb. n.	*Ferrisia virgata* (Cockerell)
5. *Anagyrietta qadrii* (Hayat *et al.*) comb. n.	*Ferrisia virgata* (Cockerell)
6. *Anagyrus alami* Hayat	*Nipaecoccus* sp.
	Pseudococcus sp.
7. *Anagyrus albiclavatus* sp. n.	*Nipaecoccus* sp.
8. *Anagyrus aligarhensis* Agarwal	*Saccharicoccus sacchari* (Cockerell)
9. *Anagyrus almoriensis* Shafee *et al.*	*Nipaecoccus vastator* (Maskell)
10. *Anagyrus amoenus* Compere	Mealy bug
11. *Anagyrus aquilonaris* (Noyes & Hayat) comb. n.	Unknown
12. *Anagyrus citri* Agarwal	*Planococcus citri* (Risso)
13. *Anagyrus comperei* Subba Rao & Rai	*Ferrisia virgata* (Cockerell)
14. *Anagyrus crassipennis* sp. n.	Unknown
15. *Anagyrus diversicornis* Mercet	Unknown

Parasite	Host
16. *Anagyrus flavidus* Shafee *et al.*	*Planococcoides robustus* Ezzat & McConell
	Pseudococcus sp.
17. *Anagyrus gunturiensis* Shafee *et al.*	*Nipaecoccus vastator* (Maskell)
	N. viridis (Newstead)
18. *Anagyrus indicus* Shafee *et al.*	Mealy bug
	Nipaecoccus vastator (Maskell)
	Nipaecoccus viridis (Newstead)
	Coccidohystrix sp.
	Ferrisia virgata (Cockerell)
	Rastrococcus iceryoides (Green)
19. *Anagyrus kivuensis* Compere	*Ferrisia virgata* (Cockerell)
20. *Anagyrus longipennis* Shafee *et al.*	Coccid
	Nipaecoccus viridis (Newstead)
21. *Anagyrus longiventris* Hayat	Unknown
22. *Anagyrus nigriclavatus* sp. n.	Unknown
23. *Anagyrus nigricorpus* Shafee *et al.*	*Phenacoccus indicus* (Avasthi & Shafee)
24. *Anagyrus nigroradiclatus* Subba Rao & Rai	*Nipaecoccus vastator* (Maskell)
25. *Anagyrus postmarginalis* sp. n.	*Nipaecoccus vastator* (Maskell)

Parasite	Host
26. Anagyrus ranchiensis Shamim & Shafee	Coccidohystrix insolitus (Green)
27. Anagyrus sawadai Ishii	Rastrococcus iceryoides (Green)
28. Anagyrus scutomaculatus Agarwal	Coccidohystrix insolitus (Green)
	Dysmicoccus williamsi Avasthi & Shafee
	Nipaecoccus vastator (Maskell)
	Nipaecoccus viridis (Newstead)
	Planococcoides robustus Ezzat & McConnel
	Rastrococcus cappariae Avasthi & Shafee
29. Anagyrus shahidi Hayat	Unknown
30. Anagyrus swezeyi Timberlake	Saccharicoccus sacchari (Cockerell)
31. Anagyrus tibimaculatus Agarwal	Planococcoides robustus Ezzat & McConnell
	Planococcus citri (Risso)
32. Anagyrus varicornis (Shamim & Shafee) comb. n.	Unknown
33. Anomalencyrtus longicornis Hayat & Verma	Unknown
34. Anomalicornis tenuicornis Mercet	Unknown
35. Apodoliphoceras tachikawai (Shafee et al.)	Coccidohystrix insolitus (Green)
36. Apoleptomastix longicorpus (Shamim & Shafee)comb.n.	Nipaecoccus vastator (Maskell)

Parasite	Host
37. Apoleptomastix poonensis (Mani & Kaul)	Unknown
38. Apoleptomastix ranchiensis (Shamim & Shafee)comb.n	Coccidohystrix insolitus (Green)
39. Apoleptomastix rufipleuris Kerrich	Unknown
40. Apoleptomastix rufiscapus Kerrich	Unknown
41. Apoleptomastix spoliata Kerrich	Unknown
42. Bacalusa fuscipennis Noyes & Hayat	Unknown
43. Blepyrus annulobliqus Kaul & Agarwal	Unknown
44. Blepyrus insularis (Cameron)	Mealybugs
45. Callipteroma quinqueguttata Motschulsky	Unknown
46. Callipteroma testacea Motschulsky	Sugarcane Mealybug
47. Charitopus apicatus (Mani & Saraswat)	Unknown
48. Charitopus fulviventris Foerster	Unknown
49. Charitopus nigricorpus Shamim & Shafee	Unknown
50. Charitopus orientalis Agarwal	Chionaspidis sp.
	Coccidohystrix insolitus (Green)
51. Charitopus panchgania (Mani & Saraswat)	Unknown
52. Clausenia lacca (Agarwal)	Laccifer lacca (Kerr)
	Rastrococcus sp.

Parasite	Host
53. Clausenia longipennis Shafee & Avasthi	Coccidohystrix insolitus (Green)
54. Doliphoceras biharensis Shamim & Shafee	Coccidohystrix insolitus (Green)
55. Doliphoceras gracilis Hayat	Mealy bug
56. Eotopus albipedicellus (Shamim & Shafee)comb.n.	Icerya pilosa Green
57. Eotopus beneficus (Shafee)	Icerya pilosa Green
58. Gyranusoidea ceroplastis (Agarwal)	Coccid
59. Gyranusoidea flava Shafee et al.	Planococcoides robustus Ezzat & McConnell
60. Gyranusoidea indica Shafee et al.	Nipaecoccus sp.
	Nipaecoccus viridis (Newstead)
61. Gyranusoidea mirzai (Agarwal)	Ferrisia virgata (Cockerell)
	Icerya formicarum Newstead
	Nipaecoccus sp.
	Nipaecoccus viridis (Newstead)
	Planococcus citri (Risso)
	Rastrococcus iceryoides (Green)
62. Gyranusoidea pallida Alam	Ceroplastes rubens ?
	Mealy bug

Parasite	Host
63. Hamusencyrtus indicus (Shafee et al.)	Saccharicoccus sacchari (Cockerell)
64. Hamusencyrtus mymaricoides (Compere et al.)	Pseudococcids
65. Leptomastidea shafeei Hayat & Subba Rao	Coccid
66. Leptomastix aligarhensis Khan & Shafee	Coccid
67. Leptomastix brevipedicelus Khan & Shafee	Coccid
68. Leptomastix brevis Hayat et al.	Icerya aegyptica (Douglas)
69. Leptomastix dactylopii Howard	Phenacoccus saccharifolii (Green)
70. Leptomastix gunturiensis Shafee	Nipaecoccus vastator (Maskell)
71. Leptomastix longicornis Khan & Shafee	Coccid
72. Leptomastix longiscapus Khan & Agarwal	Coccid
73. Leptomastix nigrocoxalis Compere	Coccidohystrix insolitus (Green)
	Icerya aegyptica (Douglas)
	Nipaecoccus sp.
	Nipaecoccus viridis (Newstead)
	Phenacoccus sp.
	Planococcus citri (Risso)

Parasite	Host
74. Manicnemus indicus (Mani & Saraswat)	Greenaspis divergens (Green)
75. Leptomastix salemensis Hayat et al.	Coccids
76. Leptomastix singularis Shafee	Mealy bug
77. Mashhoodia flava Shafee	Phenacoccus indicus (Avasthi & Shafee)
78. Mashhoodia indica Shafee	Phenacoccus indicus (Avasthi & Shafee)
79. Metaphaenodiscus aligarhensis Hayat	Unknown
80. Metaphaenodiscus nigropedicellus sp. n.	Unknown
81. Mira ajmerensis sp. n.	Unknown
82. Neodiscodes indicus Narayanan & Subba Rao	Icerya formicarum Newstead
	Nipaecoccus sp.
	Nipaecoccus viridis (Newstead)
	Planococcoides robustus Ezzat & McConnell
83. Neodiscodes lepelleyi Kerrich	Planococcus lilacinus (Cockerell)
84. Neodiscodes simlaensis Kaul & Agarwal	Unknown
85. Neodusmetia sangwani (Subba Rao)	Antonina sp.

Parasite	Host
	Antonina indica (Maskell)
	Antonina graminis (Maskell)
86. Neoplatycerus tachikawai Subba Rao	Icerya seychellarum (Westwood)
	Rastrococcus iceryoides (Green)
87. Platyrhopus aligarhensis sp. n.	Adelosoma phragmitidis Borchenius
88. Praleurocerus axillaria Khan	Scale insects
89. Praleurocerus axilloseparatus Kaul & Agarwal	Scale insects
90. Praleurocerus frontolatus Kaul & Agarwal	Scale insects
91. Praleurocerus indicus Khan & Agarwal	Planococcoides robustus Ezzat & McConnell
	Rastrococcus iceryoides (Green)
92. Praleurocerus viridis (Agarwal)	Planococcoides robustus Ezzat & McConnell
	Rastrococcus iceryoides (Green)
93. Rhopus desantisiellus Ghesquiere	Sugarcane Mealy bug
94. Rhopus gramineus Hayat	Antonina sp.
95. Rhopus sacchari (Alam)	Ripersia sacchari (Green)

	Parasite	Host
96.	Sakencyrtus mirus Hayat	Unknown
97.	Tetracnemus bifasciatella Mercet	Unknown
98.	Tetracnemus deccanensis (Mani & Kaul)	Pseudococcid
99.	Tetracnemus diversicornis Westwood	Pseudococcid
100.	Tetracnemus halimi sp. n.	Unknown
101.	Tetracnemus heterocornis Mani & Saraswat	Pseudococcid
102.	Tetracnemus terebratus sp. n.	Unknown
103.	Xanthoencyrtus fullawayi Timberlake	Saccharicoccus sacchari (Cockerell)
104.	Xanthoencyrtus longiclavatus Shafee et al.	Maconellicoccus hirsutus (Green)
105.	Xanthoencyrtus qadrii Shafee et al.	Ripersia sp.

V. APPENDIX B. HOST (INSECT PESTS) AND THEIR TETRACNEMINE PARASITES, IN INDIA

Host	Parasite
1. *Adelosoma phragmitidis* Borchenius	*Platyrhopus aligarhensis* sp. n.
2. *Antonina graminis* (Maskell)	*Neodusmetia sangwani* (Subba Rao)
3. *Antonina indica* (Maskell)	*Neodusmetia sangwani* (Subba Rao)
4. *Antonina* sp.	*Neodusmetia sangwani* (Subba Rao)
	Rhopus gramineus Hayat
5. *Ceroplastes rubens* ?	*Gyranusoidea pallida* Alam
6. *Chionaspidis* sp. ?	*Charitopus orientalis* Agarwal
7. *Coccidohystrix insolitus* (Green)	*Anagyrus ranchiensis* Shamim & Shafee
	Anagyrus scutomaculatus Agarwal
	Apodoliphoceras tachikawai (Shafee *et al.*)
	Apoleptomastix ranchiensis (Shamim & Shafee) comb.n.
	Charitopus orientalis Agarwal
	Clausenia longipennis Shafee & Avasthi
	Doliphoceras biharensis Shamim & Shafee
	Leptomastix nigrocoxalis Compere
8. *Coccidohystrix* sp.	*Anagyrus indicus* Shafee *et al.*
9. *Dysmicoccus williamsi* Avasthi & Shafee	*Anagyrus scutomaculatus* Agarwal

Host	Parasite
10. Ferrisia virgata (Cockerell)	Aenasius advena Compere
	Anagyrietta brevicornis (Shamim & Shafee) comb.n.
	Anagyrietta indica (Subba Rao) comb. n.
	Anagyrietta qadrii (Hayat et al.) comb. n.
	Anagyrus comperei Subba Rao & Rai
	Anagyrus indicus Shafee et al.
	Anagyrus kivuensis Compere
	Gyranusoidea mirzai (Agarwal)
11. Greenaspis divergens (Green) ?	Manicnemus indicus (Mani & Saraswat)
12. Icerya aegyptica (Douglas)	Leptomastix brevis Hayat et al.
	Leptomastix nigrocoxalis Compere
13. Icerya formicarum Newstead	Gyranusoidea mirzai (Agarwal)
	Neodiscodes indicus Narayanan & Subba Rao
14. Icerya pilosa Green	Eotopus albipedicellus (Shamim & Shafee) comb. n.
	Eotopus beneficus (Shafee)
15. Icerya seychellarum (Westwood)	Neoplatycerus tachikawai Subba Rao

Host	Parasite
16. Laccifer lacca (Kerr) ?	Clausenia lacca (Kerr)
17. Maconellicoccus hirsutus (Green)	Xanthoencyrtus longiclavatus Shafee et al.
18. Nipaecoccus vastator (Maskell)	Alamella flava Agarwal
	Anagyrus almoriensis Shafee et al.
	Anagyrus gunturiensis Shafee et al.
	Anagyrus indicus Shafee et al.
	Anagyrus nigroradiclatus Subba Rao & Rai
	Anagyrus postmarginalis sp. n.
	Anagyrus scutomaculatus Agarwal
	Apoleptomastix longicorpus (Shamim & Shafee) comb. n.
19. Nipaecoccus viridis (Newstead)	Anagyrus gunturiensis Shafee et al.
	Anagyrus indicus Shafee et al.
	Anagyrus longipennis Shafee et al.
	Anagyrus scutomaculatus Agarwal
	Gyranusoidea indica Shafee et al.
	Gyranusoidea mirzai (Agarwal)
	Leptomastix nigrocoxalis Compere
	Neodiscodes indicus Narayanan & Subba Rao

Host	Parasite
20. Nipaecoccus sp.	Alamella flava Agarwal
	Anagyrus alami Hayat
	Anagyrus albiclavatus sp. n.
	Gyranusoidea indica Shafee et al.
	Gyranusoidea mirzai (Agarwal)
	Leptomastix nigrocoxalis Compere
	Neodiscodes indicus Narayanan & Subba Rao
21. Phenacoccus indicus (Avasthi & Shafee)	Anagyrus nigricorpus Shafee et al.
	Mashhoodia flava Shafee
	Mashhoodia indica Shafee
22. Phenacoccus saccharifolii (Green)	Leptomastix dactylopii Howard
23. Phenacoccus sp.	Leptomastix nigrocoxalis Compere
24. Planococcoides robustus Ezzat & McConnell	Anagyrus flavidus Shafee et al.
	Anagyrus scutomaculatus Agarwal
	Anagyrus tibimaculatus Agarwal
	Gyranusoidea flava Shafee et al.
	Neodiscodes indicus Narayanan & Subba Rao

Host	Parasite
	Praleurocerus indicus Khan & Agarwal
	Praleurocerus viridis (Agarwal)
25. Planococcus citri (Risso)	Anagyrus citri Agarwal
	Anagyrus tibimaculatus Agarwal
	Gyranusoidea mirzai (Agarwal)
	Leptomastix nigrocoxalis Compere
26. Planococcus lilacinus (Cockerell)	Neodiscodes lepelleyi Kerrich
27. Pseudococcus sp.	Anagyrus alami Hayat
	Anagyrus flavidus Shafee et al.
28. Rastrococcus cappariae Avasthi & Shafee	Anagyrus scutomaculatus Agarwal
29. Rastrococcus iceryoides (Green)	Anagyrus indicus Shafee et al.
	Anagyrus sawadai Ishii
	Gyranusoidea mirzai (Agarwal)
	Neoplatycerus tachikawai Subba Rao
	Praleurocerus indicus Khan & Agarwal
	Praleurocerus viridis (Agarwal)

Host	Parasite
30. Rastrococcus sp.	Clausenia lacca (Agarwal)
31. Ripersia sacchari (Green)	Rhopus sacchari (Alam)
32. Ripersia sp.	Xanthoencyrtus qadrii Shafee et al.
33. Saccharicoccus sacchari (Cockerell)	Anagyrus aligarhensis Agarwal
	Anagyrus swezeyi Timberlake
	Hamusencyrtus indicus (Shafee et al.)
	Xanthoencyrtus fullawayi Timberlake

INDETERMINED SPECIES

Coccid	Anagyrus longipennis Shafee et al.
	Gyranusoidea ceroplastis (Agarwal)
	Leptomastidea shafeei Hayat & Subba Rao
	Leptomastix aligarhensis Khan & Shafee
	Leptomastix brevipedicelus Khan & Shafee
	Leptomastix longicornis Khan & Shafee
	Leptomastix longiscapus Khan & Agarwal
	Leptomastix salemensis Hayat et al.

Host	Parasite
	Praleurocerus axillaria Khan
	Praleurocerus axilloseparatus Kaul & Agarwal
	Praleurocerus frontolatus Kaul & Agarwal
Mealy bug	Anagyrus amoenus Compere
	Anagyrus indicus Shafee et al.
	Blepyrus insularis (Cameron)
	Callipteroma testacea Motschulsky
	Callipteroma quinqueguttata Motschulsky
	Doliphoceras gracilis Hayat
	Gyranusoidea pallida Alam
	Leptomastix singularis Shafee
	Rhopus desantisiellus Ghesquiere
Pseudococcid	Hamusencyrtus mymaricoides (Compere et al.)
	Tetracnemus deccanensis (Mani & Kaul)
	Tetracnemus diversicornis Westwood
	Tetracnemus heterocornis Mani & Saraswat

VI. DISCUSSION

i. Significance of morphological structures in the classification of Tetracneminae

Number of tarsal segments, presence or absence of paratergites and dentition of mandibles are regarded as subfamily characters. Immovably fused and movably articulated condition of third valvulae with second valvifers, broad or narrow condition of costal cell of fore wings are taken as tribal characters. Exserted or hidden condition of ovipositor, normal or flattened condition of flagellum, presence or absence of parapsidal furrows on mesoscutum, narrow or broad condition of the paratergites, presence or absence of prolongation on base of first valvifers, normal or flattened condition of body and normal or medially constricted condition of pronotum are considered as subtribal characters.

Number and length of antennal segments, shape of pronotum, presence or absence of antero-lateral apodemes on female subgenital plate, shape of second valvifer, presence or absence of sickle-shaped prolongation of outer plate, cylindrical or expanded condition of scape, macropterous or brachypterous condition, presence or absence of malar sutures, hyaline or infuscated condition of fore wings, punctiform or developed condition of marginal veins of fore wings are regarded as characters of generic importance. Coloration of different components of the body, size of the antennal segments, length

and width of the fore wings, length of marginal, postmarginal and stigmal veins and shape of genitalia are considered as specific characters.

Observations on conventional as well as genitalic characters have resulted certain changes in nomenclature at various levels. The tribe Anomalicornini Hoffer is synonymized with Anagyrina Hoffer since the type genera of both the groups are so closely related that it is inevitable to place them under one group. The tribe Grandoriellini Trjapitzin is synonymized with Ericydnini Hoffer since Noyes & Hayat (1984) recognized Grandoriella Domenichini as synonym of Ericydnus Walker. They have not pointed out this tribal synonymy.

The genera Paraclausenia Hayat and Clausenia Ishii are separated on the basis of the sculpture of the scutellum which the present author considers of specific value. Therefore, Paraclausenia Hayat is synomymized with Clausenia Ishii. The genera Cremesina and Anagyrus are separated on the basis of presence or absence of infuscation and filum spinosum on fore wings which is also of specific value. Therefore, Cremesina Noyes & Hayat is synonymized with Anagyrus Howard. Adektitopus gordhi Noyes & Hayat, the type-species of Adektitopus is synonymized with Clausenia longipennis Shafee & Avasthi. This has resulted the synonymy of Adektitopus Noyes & Hayat with Clausenia Ishii. The genera Charitopus Foerster and Neocharitopus Hayat et al. separated on the basis of length of funicle segments which is considered here of specific value. Therefore, the genus Neocharitopus is synonymized with Charitopus. The generic

characters proposed by De Santis (1963) for Leptanusia agrees in every respect with Anagyrietta Ferriere. Anagyrietta has priority over Leptanusia. Therefore, the latter name is suppressed.

The species Clausenia lacca (Agarwal), Paraclausenia herbicola Hayat and Clausenia indica Shafee & Avasthi are conspecific. Therefore, the latter two names are synonymized with Clausenia lacca (Agarwal). Noyes & Hayat (1984) shifted the species Leptomastidea indica Subba Rao and Mashhoodia flava Shafee to Anagyrus Howard and proposed new names A. inopus for indicus Shafee et al. nec Subba Rao and A. ferus for flava Shafee nec Ishii. The present author after a detailed study shifted indica Subba Rao to Anagyrietta Ferriere and flava Shafee to Mashhoodia and synonymized A. inopus Noyes & Hayat with A. indicus Shafee et al. and A. ferus Noyes & Hayat with Mashhoodia flava Shafee. The species A. agraensis Saraswat and A. punctulatus Agarwal are synonymized with A. indicus Shafee et al. and A. swezeyi Timberlake respectively.

Parasite-host and host-parasite indices reveals that the members of the subfamily Tetracneminae are mostly parasitic on Pseudococcids. This is in consonance with the views of Tachikawa (1963), Kerrich (1967) and Shafee et al. (1975).

ii. Phylogeny

Phylogeny (fig. 36) is proposed mainly based on the primitive and evolved characters. The characters viz. 5-segmented tarsi,

sclerotized and large size body, coarsely punctate condition of head, flattened condition of antennae, presence of ring segments on antennae, broad paratergites, movably articulated condition of third valvulae with second valvifers are taken as primitive characters. On the other hand, 4-segmented tarsi, unsclerotized and small to moderate size body, impunctate condition of the head, normal antennae without ring segments, long and narrow paratergites, immovably fused condition of third valvulae with second valvifers, flattened condition of body are regarded as evolved characters.

Based on the above characters the tribe Aenasiini is probably the most primitive among the tribes of Tetracneminae from which the tribe Tetracnemini has evolved. The subtribe Dinocarsiina occupies an intermediate position between Tetracnemini and Charitopodina. Tetracnemina has evolved independently from Tetracnemini. Anagyrina is supposed to be evolved from Charitopodina in lacking the parapsidal furrows on mesoscutum. Rhopina is probably the highly evolved subtribe of Tetracneminae and represent an off shoot of Anagyrina. The subfamily Encyrtinae is also evolved from Aenasiini and occupies an intermediate position between Aenasiini and Arrhenophaginae.

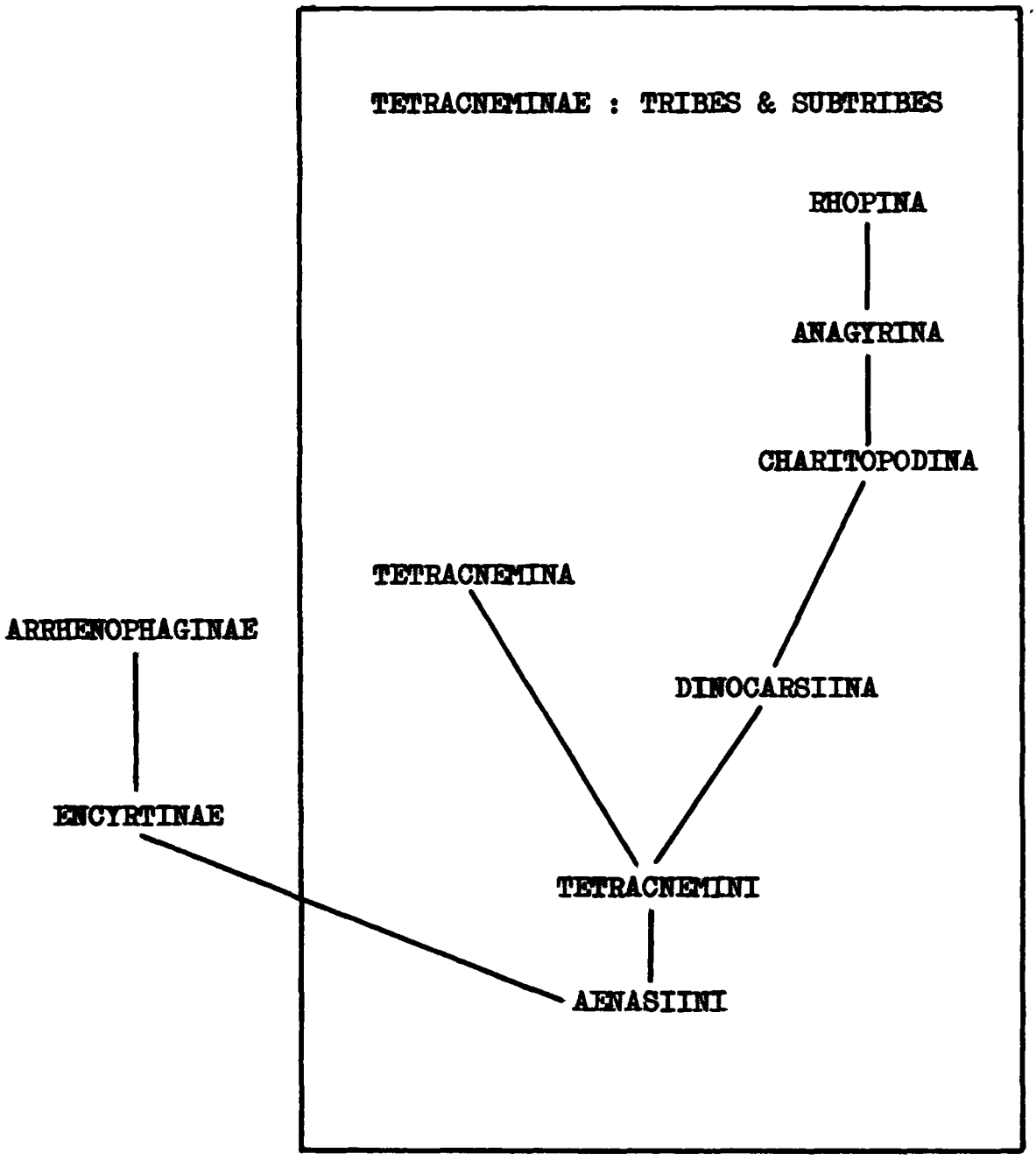
TETRACNEMINAE : TRIBES & SUBTRIBES
RHOPINA
ANAGYRINA
CHARITOPODINA
TETRACNEMINA
DINOCARSIINA
ARRHENOPHAGINAE
ENCYRTINAE
TETRACNEMINI
AENASIINI

Fig. 36

VII. REFERENCES

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MITTEILUNGEN DER SCHWEIZERISCHEN ENTOMOLOGISCHEN GESELLSCHAFT
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Descriptions of two new species of Leptanusia (Hymenoptera: Encyrtidae) from Patna, India

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Two new species: *Leptanusia brevicornis* sp. n. and *Leptanusia varicornis* sp n from Patna are described and illustrated Revised key to species of *Leptanusia* DE SANTIS is also given Types deposited in Zoological Museum, Aligarh Muslim University, Aligarh, India

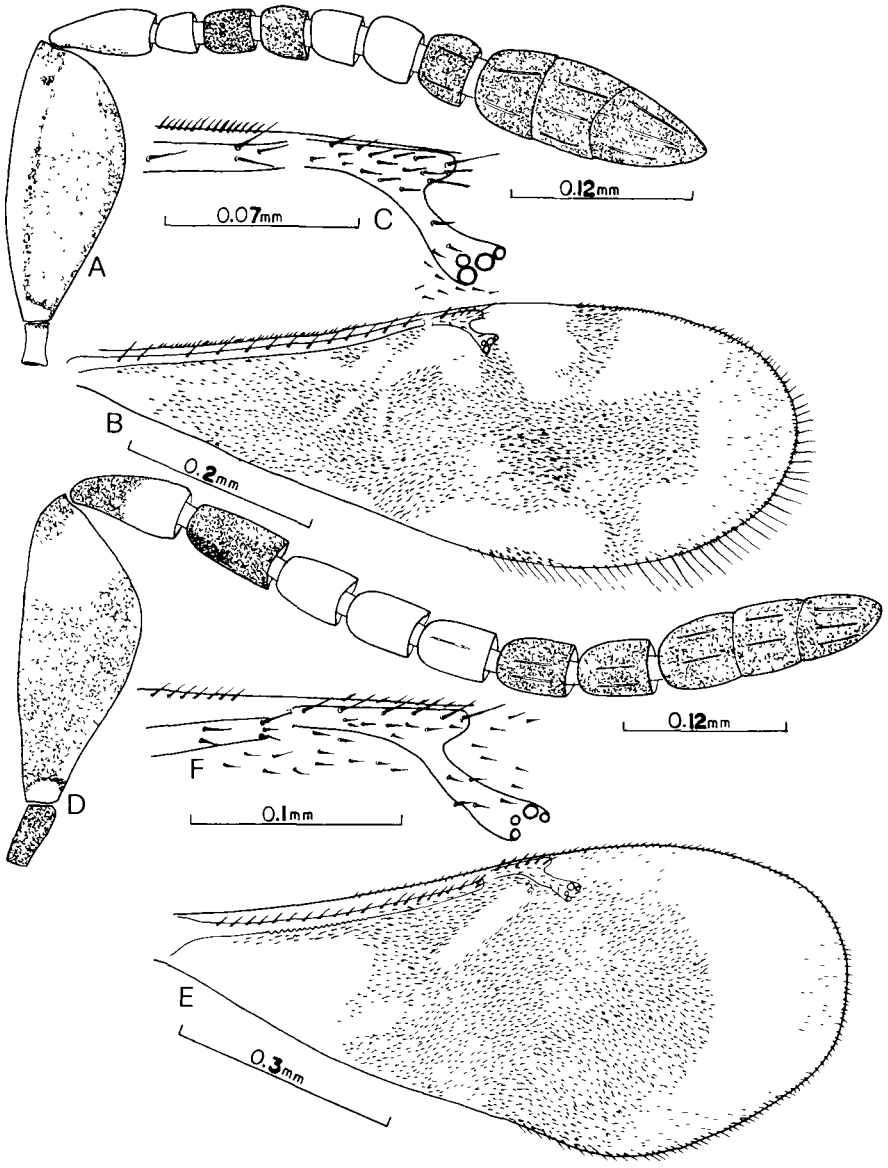
Genus *Leptanusia* DE SANTIS

Leptanusia DE SANTIS, 1963: 80.
Type-species: *Leptomastidea pseudococci* BRETHES, by monotypy.

The generic characters proposed by DE SANTIS (1963) and ALAM & SHAFEE (1981) for the genus *Leptanusia* apply well on the species including two new species. HAYAT *et al.* (1975) key to species of *Leptanusia* DE SANTIS has been revised in order to accommodate the new species.

Revised key to species of Leptanusia DE SANTIS, *based on females.*

1. Funicle of uniform colour; funicle segment first more than two and a half times as long as wide, as long as or longer than pedicel; fore wings with postmarginal vein as long as or longer than stigmal vein 2
- Funicle with black and white segments; funicle segment first at most twice as long as wide, shorter than pedicel; fore wings with postmarginal vein much shorter than stigmal vein 4
2. Club brownish, three times as long as wide; postmarginal and stigmal veins subequal 3
- Club white, two and a half times as long as wide; postmarginal vein much longer than stigmal vein . . . . . *pseudococci* (BRETHES)
3. Head dorsum slightly less than two times as wide as long; width of frontovertex more than one-third head width; scape brownish with a long whitish strip in middle . . . . . *Szelenyii* HOFFER
- Head dorsum more than two times as wide as long; width of frontovertex about one-third head width; scape whitish with a long patch on dorsal side at distal half, and an irregular patch on ventral surface . . . . *quadri* HAYAT et al.
4. Funicle segments 1,4 and 5th white, remaining dark; pedicel as long as following two funicle segments together; funicle segments 1–6 quadrate; disc of forewings with five patches of transparent setae . . . . . *brevicornis* sp. n.



Figs. A–F, A–C, *Leptanusia brevicornis* sp. n., ♀: A, Antenna; B, forewing; C, part of forewing venation. D–F, *Leptanusia varicornis* sp. n., ♀: D, antenna; E, fore wing; F, part of fore wing venation.

- Funicle segments 2–4 white, remaining dark; pedicel distinctly shorter than following two funicle segments together; funicle segments 1–6 longer than wide; disc of fore-wings with semicircular band of transparent setae *varicornis* sp. n.

Leptanusia brevicornis sp. n. (Figs. A–C)

Female

Head orange yellow, finely punctate; frontovertex slightly less than twice as long as wide; ocelli white, arranged slightly in obtuse triangle, lateral ocellus separated by its own diameter from inner orbital and occipital margins separately; eyes silvery white; malar sutures absent; malar space shorter than eye width; antennae inserted below ocular line, interantennal space slightly less than width of frons between eyes at median ocellus; mandibles bidentate. Antennae (Fig. A) white except funicle segments 2nd, 3rd, 6th and club dark; scape lightly infuscated, basal three–fourth and inner margin dark; scape flattened, two and a half times as long as wide; pedicel about twice as long as wide, as long as basal two funicle segments together; funicle segments quadrate; club 3-segmented, slightly less than three times as long as wide, about as long as preceding four funicle segments together.

Thorax yellowish except dorsum infuscated; mesoscutum without parapsidal furrows. Fore wings (fig. B) with patches of coarse and hyaline setae; slightly less than three times as long as wide; costal cell narrow; submarginal vein with 15 setae; marginal vein slightly longer than stigmal vein; postmarginal vein rudimentary (fig. C).

Abdomen orange yellow except dorsum influscated, longer than thorax; cercal plates located on basal one-third, paratergites present; subgenital plate reaching apex of abdomen; ovipositor hidden, arising from apical one-third of abdominal venter.

Body length: 1.22 mm.

Holotype ♀, INDIA: Bihar, Patna, Danapur, ex *Ferrisia virgata* Cockerell, 10.I.1984 (S.M. Shamim).

Leptanusia varicornis sp. n. (Figs. D–F)

Female

Resembles *L. brevicornis* sp. n. except in the following characters:

Antennae (fig. D) dark except apical one-third of scape, apical half of pedicel, funicle segments 2–4 white; pedicel much shorter than following two funicle segments together; funicle segment first twice as long as wide, 2–6 distinctly longer than wide; fore wings (fig. E) with semicircular band of transparent setae apically, slightly more than twice as long as wide; marginal fringe short.

Body length: 1.4 mm.

Holotype ♀, INDIA: Bihar, Patna, Danapur, 10.I.1984, (S.M. Shamim).

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FOUR NEW SPECIES OF ENCYRTIDAE (HYMENOPTERA) FROM BIHAR, INDIA

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ABSTRACT. Four new species: *Xiphomastix ranchiensis* sp. n., *Xiphomastix longicorpus* sp. n., *Ericydnus albipedicellus* sp. n. and *Anagyrus ranchiensis* sp. n. are described and illustrated. Types deposited in Zoological Museum, Aligarh Muslim University, Aligarh, India.

Genus *Xiphomastix* De Santis

Xiphomastix De Santis, 1972: 45.

Type-species: *Xiphomastix bellator* De Santis, by original designation.

Head dark, sparsely punctate; malar space shorter than eye width; mandibles bidentate; maxillary palpi 4-segmented, labial palpi 3-segmented. Antennae (fig. A) 11-segmented, inserted at lower level of eyes; scape cylindrical; pedicel shorter than first funicle segment; funicle 6-segmented, segments much longer than wide; club 3-segmented. Fore wings with costal cell very narrow; marginal, postmarginal veins well developed. Abdomen much longer than thorax; cerci present near base of abdomen; tenth tergum long, acuminate apically (fig. C); paratergites long and narrow; third valvulae blunt, fused with second valvifers (fig. D); subgenital plate (fig. F) with well developed antero-lateral apodemes.

Comments: The genus is closely related to *Pseudleptomastix* Girault, but can be separated from this genus by having long antennae with pedicel shorter than first funicle segment, fore wings with costal cell very narrow. The genus is known to contain three species from India and a key for their separation is given below:

Key to Indian species of *Xiphomastix* De Santis, based on females

1. Fore wings with marginal vein much shorter than postmarginal vein; legs differently coloured 2

— Fore wings with marginal vein much longer than postmarginal vein; legs yellowish brown ..... *poonensis* (Mani *et al.*)

2. Abdomen dark; antennae with radicle and scape dark; club longer than third funicle segment; hind legs dark except apical half of tibiae and tarsi yellowish brown..... *ranchiensis* sp. n.

— Abdomen yellowish brown: antennae with radicle and scape yellowish brown; club as long as third funicle segment; hind legs completely yellowish brown ..... *longicorpus* sp. n.

Xiphomastix poonensis (Mani *et al.*)

Pseudleptomastix poonensis Mani *et al.* 1974: 68.
Xiphomastix poonensis (Mani *et al.*); Hayat, 1979:323.

Mani *et al.* (1974) described *Pseudleptomastix poonenis* from India and compared it with *P. flatulescens* Compere, which was earlier synonymised with *P. squammulatus* Girault by Compere (1926). A careful study has revealed that *P. poonensis* is not congeneric with *P. squammulatus* Girault, the type species of *Pseudleptomastix*. The placement of *poonensis* in *Xiphomastix* is accepted.

Xiphomastix ranchiensis sp. n. (Figs. A-F)

Female.

Head dark with scattered minute punctures, slightly wider than long in facial view; frontovertex gradually merging with face; ocelli orange yellow, arranged in equilateral triangle, lateral ocellus separated by about its diameter from inner orbital and by twice its diameter from occipital margin; eyes reddish brown, smooth; malar sutures absent; antennae inserted just above lower level of eyes, inter-antennal space about ane-fourth the width of frons between eyes at median ocellus; mandibles bidentate; maxillary and labial palpi 4 and 3-segmented respectively. Antennae (fig. A) dark except mid and apex of scape, base of first funicle segment, second funicle segment except apex white; scape cylindrical, about six times as long as wide; pedicel more than one-half the length of first funicle segmeut; segments 1–6 gradually decreasing in length distad; funicle sesment first longest, about five times as long as wide, distinctly longer than club, more than twice the length of 6th funicle segment; club 3-segmented, longer than third funicle segment.

Thorax dark, sparsely setose; mesoscutum and scutellum differently seulptured; scutellum acute apically: axillae triangular, meeting medially. Forewings lightly infuscated, three times as long as wide; costal cell very narrow; marginal vein slightly longer than stigmal and shorter than postmarginal vein (fig. B); marginal fringe short, spaced by a distance equal to one-fourth their length. Legs dark except apices

of fore femora, tibiae and tarsi of fore, mid and hind legs yellowish brown; mid tibial spur slightly longer than basitarsus.

Abdomen dark brown, distinctly longer than head and thorax combined; cercal plates situated near base of abdomen; paratergites long and narrow (fig. C),reaching apex of abdomen.

Body Length : 2.31 mm.

Holotype ♀. INDIA: Bihar, Ranchi, Agricultural University Campus, ex *Coccidohystrix insolitus* (Green), 5. x. 1982 *(S. M. Shamim)*.

Xiphomastix longicorpus sp. n. (Figs. G-H)

Female. Resembles *N. ranchiensis* sp. n. except in the following characters :

Head with puncts uniformly distributed. Antennae (fig. G) with radicle and scape yellowish brown; pedicel slightly more than half the length of first funicle segment; funicle segment first twice the length of sixth; club as long as third funicle segment. Fore wings infuscated, slightly more than three times as long as wide; transverse band of coarse setae present beneath submarginal vien; marginal vien as long as stigmal vein (fig. H). Legs dark except apical half of femora, tibiae and tarsi of fore legs, apical half of tibiae and tarsi of middle and hind legs completely yellowish brown. Abdomen dark brown.

Body length : 3.06 mm.

Holotype ♀. paratypes 2 ♀. INDIA: Bihar, Ranchi, Agricultural University campus, ex *Nipaecoccus vastator*, 5. x. 1982 *(S.M. Shamim)*.

Genus *Ericydnus* Walker

Ericydnus Walker, 1837 : 363.

Type-species: *Ericydnus paludatus* Walker, designated by westwood, 1840 :72.

Ericydnus albipedicellus sp. n (Figs. I-J)

Female.

Head with metallic bluish-green reflections, wider than long in facial view; frontovertex about as long as wide; ocelli red, arranged in obtuse triangle, lateral ocellus separated hy less than its own diameter from inner orbital margin and about its diameter from occipital margin; malar space slightly shorter than eye width; malar sutures distinct; mandibles tridentate, with median tooth long; antennae inserted near oral margin, inter-antennal space about one-third the width of frons between

eyes at median ocellus. Antennae (fig. I) dark except apical half of scape and pedicel completely white; scape more or less cylindrical, narrow at apical half, slightly more than five times as long as wide; pedicel and funicle segments 2-4 subequal in length; funicle segment first slightly shorter than second, as lang as sixth; segments 1-6 distinctly longer than wide; club 3-segmented, slightly more than three times as long as wide, longer than preceding two funicle segments together.

thorax dark brown with metallic reflections; mesoscutum with parapsidal furrows; propodeum well developed. Fore wings hyaline, slightly less than three times as long as wide; costal cell broad; marginal vein not touching wing margin, about as long a postmarginal and stigmal veins together, postmarginal vein slightly less than one-half the length of stigmal vein (fig. J); marginal fringe short, spaced by a distance equal to one-third their length. Legs orange yellow except hind coxae dark; middle legs with basitarsus dilated, longer than tibial spur.

Abdomen white except lateral margins of dorsum dark; tenth tergum small; subgenital plate reaching apex of abdomen; third valvulae long, fused with second valvifers, slightly curved.

Holotype ♀. INDIA: Bihar, Champaran, Motihari, ex *Icerya pilosa*, on *Saccharum officinarum* L., 28. vi. 1983 *(S.M. Shamim)*.

Comments: The new species is closely related to an Indian species, *Ericydnus beneficus* Shafee, from which it can be separated for having all the funicle segments distinctly longer than wide, apical half of scape and pedicel completely white, postmarginal vein less than one-half the length of stigmal vein.

Genus *Anagyrus* Howard

Anagyrus Howard, 1896, *Proc. U. S Natl. Mus.* 18:638.

Type-species : *Anagyrus greeni* Howard, by monotypy.

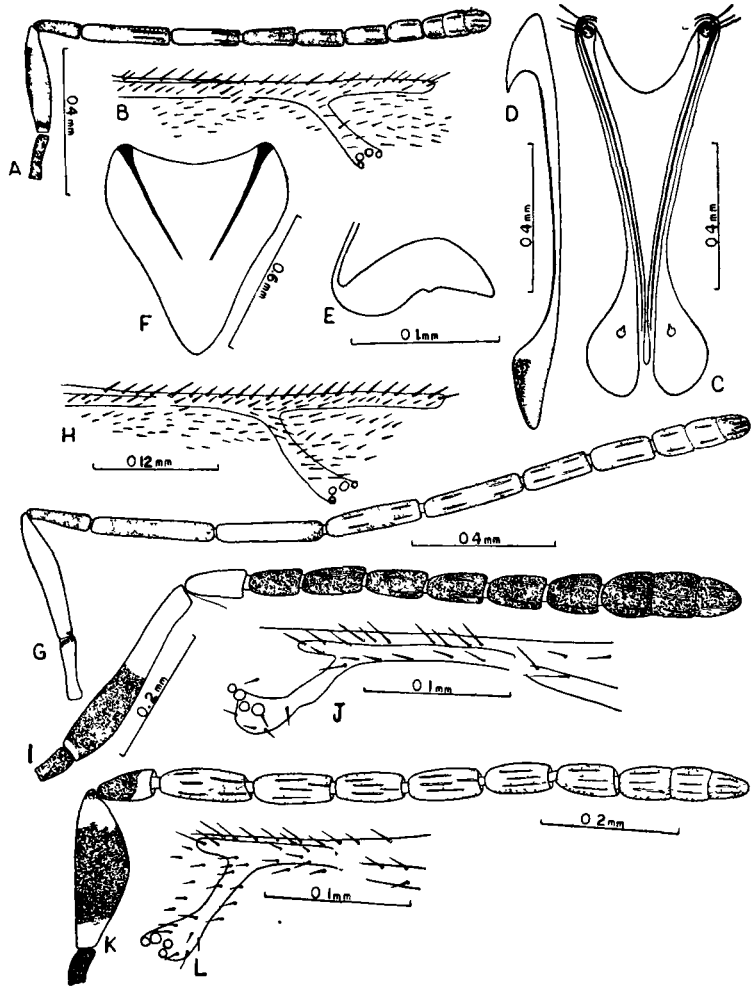
Anagyrus ranchiensis sp. n. (Figs. K-L)

Female.

Head yellowish brown; frontovertex distinctly wider than long; ocelli red, arranged slightly in obtuse triangle, lateral ocellus separated by slightly more than its own diameter from inner orbital and occipital margins separately; malar space shorter than eye width; malar sutures distinct; antennae inserted at lower level of eyes, inter antennal space about one-third the width of frons between eyes at median ocellus. Antennae (fig. K) with radicle, scape except base and apex, pedicel except apex dark; flagellum dark brown; base and apex of scape, apical one-third of pedicel white; scape two and a half times as long as wide; pedicel distinctly shorter than first

funicle segment; funicle segments 1-6 gradually decreasing in length distad, first three times as long as wide, sixth about twice as long as wide; club 3-segmented, about four times as long as wide, as long as preceding two funicle segments together.

Thorax brownish except pronotum, anterior margin of mesoscutum dark; metanotum dark brown. Fore wings hyaline, two and a half times as long a wide, costal cell well developed with small setae; marginal vien not touching wing margin,



Figs. A-L, A-F, *Xiphomastix ranchiensis* sp. n., ♀ : A, antenna; B, part of fore wing venation; C, apical terga of abdomen ; D, second valvifer; E, first valvifer; F, subgenital plate. G-H, *Xiphomastix longicorpus* sp. n., ♀ : G, antenna; H, part of fore wing venution. I-J, *Ericydnus albipedicellus* sp. n., ♀ : I, antenna; J, part of fore wing venation. K-L, *Anagyrus ranchiensis* sp. n., ♀: K, antenna; L, part of fore wing venation.

slightly shorter than stigmal vein; postmarginal vein short, less than one-half the length of marginal vein (fig. L); marginal fringe short, spaced by a distance equal to one-third their length. Legs orange yellow except lateral margin of femora and tarsi of fore legs dark; mid tibial spur slightly shorter than basitarsus.

Abdomen brownish, distinctly longer than head and thorax together; cercal plates situated near basal one-fifth of abdomen; tenth tergum long, acuminate apically; paratergites long and narrow; subgenital plate reaching apex of abdomen; 3rd valvulae long.

Body length excluding exserted part of ovipositor: 1.87 mm.
Length of exserted part of ovipositor: 0.23 mm.

Holotype ♀. INDIA: Bihar, Ranchi, Hehal, ex *Nipaecoccus vastator* on *Ficus* sp. 10. x. 1983 (*S. M. Shamim*).

Comments: The new species differs from all the known species of Anagyrus for having scape two and a half times as long as wide, pedicel shorter than first funicle segment, uniformly dark brown flagellum, marginal vein slightly shorter than stigmal vein, short postmarginal vein and slightly exserted ovipositor.

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TWO NEW SPECIES OF ENCYRTIDAE (HYMENOPTERA : CHALCIDOIDEA) FROM BIHAR, INDIA

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ABSTRACT. Two new species : *Doliphoceras biharensis* sp. n. and *Charitopus nigricorpus* sp. n. from Bihar are described and illustrated. Types deposited in Zoological Museum, Aligarh Muslim University, Aligarh, India

Doliphoceras biharensis sp. n. (Figs. A-G)

Female :

Head dark with scattered punctures; frontovertex distinctly wider than long; ocelli white, arranged in obtuse triangle, lateral ocellus separated by about twice its diameter from inner orbital margin and by about its diameter from occipital margin; eyes red; malar space almost as long as eye width; antennae inserted at lower level of eyes, inter-antennal space about one-third the width of frons between eyes at median ocellus. Antennae (fig. A) dark brown, scape slightly more than three times as long as wide, pedicel about twice as long as wide, as long as first funicle segment: funicle segment first longest, 2-6 subequal in length; club 3-segmented, three and a half times as long as wide, shorter than preceding three funicle segments together.

Thorax dark; pronotum (fig. B) with a submarginal ridge along posterior margin; mesoscutum entire, without parapsidal furrows; axillae triangular, meeting medially. Forewings hyaline, two and a half times as long as wide; costal cell well developed; marginal vein as long as stigmal, more than twice the length of post-marginal vein (fig. C); marginal fringe short, spaced by a distance equal to one-third their width. Legs orange yellow except tibiae and tarsi of fore legs, tarsi of hind legs lightly infuscated; coxae of middle and hind legs and basal three-fourth of hind femora dark brown.

Abdomen dark, longer than head and thorax together; tenth tergum long; paratergites long and narrow (fig. D); subgenital plate (fig. G) V-shaped with well developed antero-lateral apodemes; second valvifers long and narrow with a finger-

like prolongation apically, first valvifers semicircular, outer plate of genitalia with a long sickle shaped prolongation apically (fig. E).

Body length excluding exserted part of ovipositor : 1.57 mm.
Length of ovipositor : 0.12 mm.

Holotype ♀ , 4 ♀ paratypes, INDIA, Bihar, Ranchi, Mesra, ex. *Coccidohystrix insolitus* (Green), on *Solanum* sp. 10.×.1983. (*S.M. Shamim*)

Comments : The new species is closely related to *Doliphoceras gracilis* Hayat, but can be separated by the following key characters :

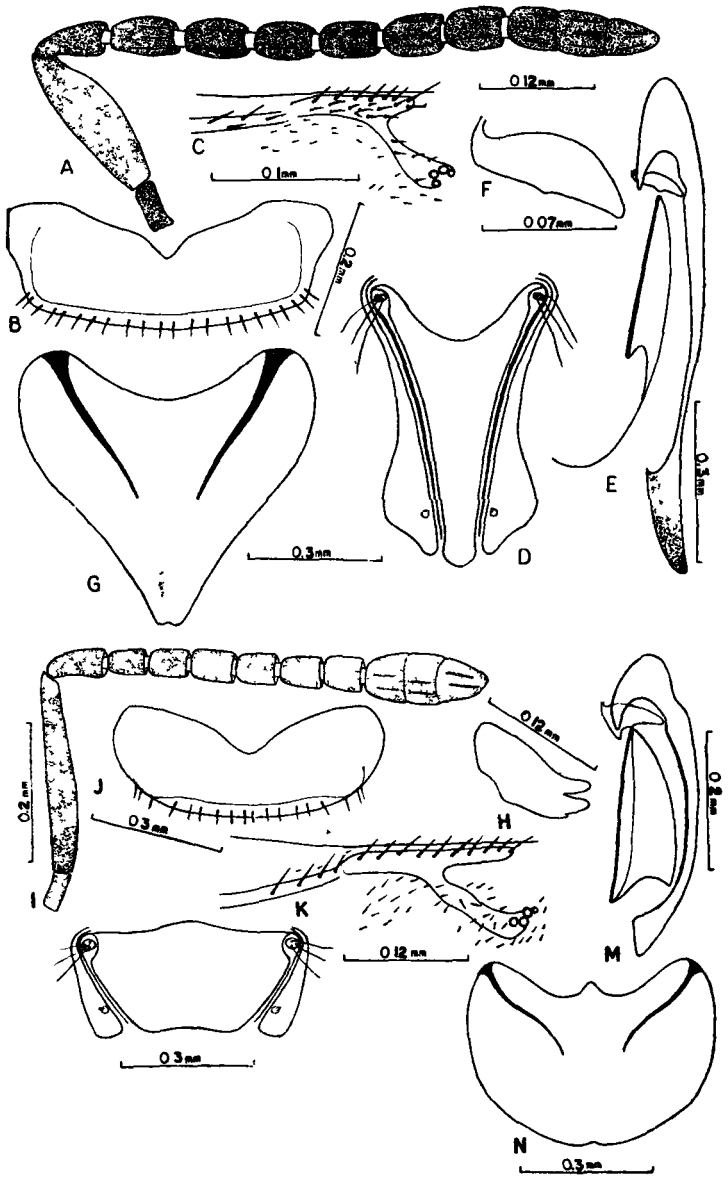
1. Scape nearly four times as long as wide, pedicel less than twice as long as wide; funicle segments 1—6 subequal in length, each twice as long as wide: tenth tergum testaceous; subocular sutures distinct... ... .,*D. gracilis*. Hayat
— Scape three times as long as wide; pedicel twice as long as wide; funicle segment first longest, segments 1-6 each less than twice as long as wide; tenth tergum dark; subocular sutures indistinct ... ... *D. biharensis* sp. n.

Charitopus nigricorpus sp. n. (Figs. H-N)

Female :

Head dark with metallic bluish green reflections, slightly wider than long in facial view; scrobes deep and convergent above; eyes reddish brown, sparsely setose; frontovertex about as long as wide; ocelli white, arranged in slightly obtuse triangle, lateral ocellus separated by about its own diameter from inner orbital and occipital margins separately; antennae inserted below ocular line; inter-antennal space about one-half the width of frons between eyes at median ocellus; malar space shorter than eye width; mandibles bidentate with minute tooth on outer margin: maxillary and labial palpi 4 and 3-segmented respectively. Antennae (fig. I) dark with metallic reflections; scape long and cylindrical, about seven times as long as wide; pedicel distinctly longer than first funicle segment; funicle 6-segmented, segments subequal in length, each longer than wide; club 3-segmented, about as long as preceding three funicle segments together.

Thorax dark; mesoscutum reticulately sculptured and sparsely setose; scutellum long; tudinally reticulately sculptured and less sparsely setose; axillae triangular, meeting medially. Fore wings hyaline with a transverse infuscated patch beneath the stigmal vein, slightly more than twice as long as wide; costal cell broad; submarginal vein with II long setae; marginal vein about as long as stigmal and longer than postmarginal vein; disc with hyaline setae excepat transverse band



Figs. A-N. A--G, *Doliphoceras biharensis* sp. n. ♀ : A, Antenna; B, pronotum; C, part of fore wing venation; D, apical terga of abdomen; E, part of external genitalia; F, first valvifer; G, subgenital plate. H-N, *Charitopus nigricorpus* sp. n. ♀ : H, Mandible; I, antenna; J, pronotum; K, part of fore wing venation; L, apical terga of abdomen; M, part of external genitalia; N, subgenital plate.

beneath stigmal vein and at apical margin of wing with coarse setae; marginal fringe short, spaced by a distance equal to one-third their length. Hind wings hyaline, slightly less than four times as long as wide; marginal fringe about one-fourth the wing width. Legs dark except spurs and basal four tarsal segments of all legs, apex of tibiae of middle leg yellowish brown; middle leg with basitarsus slightly dilated, longer than tibial spur.

Abdomen dark, about as long as thorax; paratergites very narrow and hair like; tenth tergum broad; genitalia as shown in fig. M; subgenital plate reaches apex of abdomen; third valvulae fused with second valvifers.

Body length : 1.53 mm.

Holotype ♀, Paratype ♀. INDIA, Ranchi, Khunti, 6. x. 983, (*S. M. Shamim*).

Comments : The new species is closely related to *Charitopus orientalis* Agarwal, but can be separated for having first funicle segment as long as second, postmarginal vein shorter than stigmal vein, submarginal vein normal.

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